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MONOGRAPH OF THE NORTH AND CENTRAL
AMERICAN SPECIES OF THE GENUS
SENECIO—PART II¹

J. M. GREENMAN

*Curator of the Herbarium of the Missouri Botanical Garden
Associate Professor in the Henry Shaw School of Botany of
Washington University*

INTRODUCTION

The study upon which this monograph is based was begun nearly twenty years ago, at which time the author was an Assistant at the Gray Herbarium of Harvard University. Nearly every collection of any considerable size which came to the Herbarium, particularly from western United States, Mexico, and Central America, contained specimens of *Senecio*, many of which were either undetermined or referred doubtfully to some obscure or little known species. The identification of such material was often a laborious task, since all species recorded from a given region had to be listed and then specific identity established by a process of elimination. The available publications for such work were De Candolle's 'Prodromus,' Gray's 'Synoptical Flora,' and Hemsley's splendid contribution to the systematic literature of the botany of Mexico and Central America in the 'Biologia Centrali-Americana'; but the results obtained were often very unsatisfactory, because of the large number of new species published in scattered papers during the two decades following the appearance of the 'Synoptical Flora' and the 'Biologia.'

It was felt, therefore, that a revision of the genus, in the light of recent and more complete collections, which have accumulated from the numerous botanical explorations in different parts of North America, would be helpful to those concerned with this difficult group of plants and especially in the organization of material in different herbaria. A critical study of *Senecio* with the view of publishing eventually a

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monograph was suggested to me by Dr. B. L. Robinson, Curator of the Gray Herbarium, who very kindly offered to place at my disposal the entire representation of this genus in the Gray Herbarium, and who, moreover, willingly granted me the exceptional privilege of taking abroad the North American specimens, including all the types, for comparison and study in European herbaria. Accordingly nearly 2,000 mounted specimens were taken to Berlin; and through the courtesy of the authorities of the Royal Botanical Gardens and Museums of Berlin every facility in that institution, which is remarkably rich in Central and South American plants, was accorded me and work on the task was begun under the direction of Professor A. Engler.

It was necessary first of all to acquire a detailed knowledge of the general morphology of the genus *Senecio* as a whole, and also of the closely allied genera. The results of these investigations are briefly recorded in the first part of this monograph, namely 'Monographie der nord- und central-amerikanischen Arten der Gattung *Senecio*, I. Teil' which is frequently referred to in the following text. This preliminary work and the rich collections of the Gray and Berlin Herbaria form, therefore, the basis for the present systematic part of the monograph.

After completing my studies in Berlin I went to London, taking the Gray Herbarium specimens with me, and there spent several weeks, particularly in the examination of authentic and type specimens at the Kew Herbarium and in the Linnean Herbarium. The opportunity at Berlin, Kew, and Paris to actually compare side by side and in detail, recent specimens, or series of specimens, with many of the older types, some of which are more or less incomplete, has been of very great advantage, and, in fact, has made it possible to establish beyond doubt the identity of many of our American species.

In addition to those herbaria mentioned it also has been my good fortune to study this group of plants in several American institutions, notably the Herbarium of the Geological Survey of Canada, the United States National Her-

barium, the New York Botanical Garden Herbarium (including the Torrey Herbarium), the Herbarium of the Field Museum of Natural History, the Herbarium of the Philadelphia Academy of Natural Sciences, the Missouri Botanical Garden Herbarium, and a number of private collections. To the directors and curators of all these, as well as the owners of the private herbaria, and correspondents who have facilitated my work, I wish to express personal thanks; but I desire especially to extend most grateful acknowledgments to Dr. Benjamin Lincoln Robinson, Asa Gray Professor of Systematic Botany at Harvard University, and Geheimrath Professor Dr. Adolph Engler, Director of the Royal Botanical Gardens and Museum of Berlin, without whose coöperative interest and extreme liberality in the use of valuable scientific material under their charge, this work would have been impossible. I am also grateful to Mr. W. Botting Hemsley, of the Kew Herbarium, through whose courtesy I secured type material of certain rare Mexican species and a number of excellent drawings, some of which are here reproduced.

I have cited *exsiccatae* rather freely, particularly such as occur in American herbaria, but by no means all that have been examined, and I have given even at the expense of much repetition detailed citation of specimens in different herbaria, hoping that this would be helpful in the interpretation of species and to future students of the genus. The few plates which it is possible to include are chosen to illustrate more especially the different sections as here defined.

SENECIO [TOURN.] LINN.

Senecio [Tourn. Inst. 456. *pl.* 260. 1700] L. Sp. Pl. 2 : 866. 1753; Gen. Pl., ed. 5, 373, n. 857. 1754; Hill, Hort. Kew. 25. 1768, and ed. 2, 1769; Juss. Gen. Pl. 181. 1789; Less. Syn. 391. 1832; DC. Prodr. 6 : 340. 1837; Endl. Gen. 458, n. 2811. 1838; Hook. Fl. Bor. Am. 1 : 331. 1840, in part; Torr. & Gray, Fl. N. Am. 2 : 436. 1843; Benth. & Hook. f. Gen. Pl. 2 : 446. 1873, in part; Pfeiffer, Nom. Bot. 2² : 1136. 1874; Hemsl. Biol. Cent.-Am. Bot. 2 : 235. 1881, excl. *Cacalia*; Gray, Syn. Fl. N. Am. 1² : 383. 1884, and ed. 2, 1888; Hoffmann in Engl. & Prantl,

Nat. Pflanzenf. IV. Abt. 5, 296. 1892, excl. *Emilia*; Greenm. Monogr. Senecio, I. Teil, 1901, and in Engl. Bot. Jahrb. **32** : 1-33. 1902; Dalla Torre & Harms, Gen. Siph. 563. 1900-1907, mainly.

Jacobaea Thunb. Fl. Cap. Prodr. Praef. 1794.

Obaejaca Cass. Dict. Sci. Nat. **35** : 270. 1825.

Roldana LaLlave & Lex. Nov. Veg., fasc. 2, 13. 1825.

Rugelia Schuttlew. in Chapm. Fl. Southern U. S. 246. 1860.

Cacalia, *Cineraria*, and *Gynoxis*, in part, of authors.

Heads heterogamous and radiate, or discoid. Involucre cylindrical campanulate, occasionally flask-shaped, usually subtended by calyculate bracteoles; bracts of the involucre uniseriate, or by overlapping subbiseriate, variable in number but tending to approach a definite series of numbers, namely 5-8-13-21. Ray-flowers when present disposed in a single row, fertile; rays sometimes more or less reduced. Disk-flowers perfect; corollas slenderly tubular to abruptly amplified above into a campanulate 5-toothed limb, teeth mostly short. Anthers obtuse or slightly sagittate at the base. Style-branches subterete, recurved-spreading, truncate, rounded-obtuse, occasionally terminated by a small penicillate tuft of hairs, or (in the subgenus *Pseudogynoxis*) terminated by a triangular acute or acuminate appendage. Achenes subterete, usually ribbed, glabrous, or more or less hirtellous especially on the ribs. Pappus of numerous usually white setae.—Annual, biennial, or perennial herbs, shrubs, climbers, or even arboreous plants, with alternate or radical, very variable, pinnately or palmately veined, entire or variously divided leaves.

SYNOPSIS OF THE SUBGENERA and SECTIONS

Subgenus I. *EUSENECIO* Hoffm. Style-branches truncate, rounded-obtuse or occasionally terminated by a penicillate tuft of hairs.

A. Stems erect or ascending, not climbing.

a. Stems not abruptly terminated by a shortening of the main axis; oil-tubes not richly developed in the peripheral portion of the stem.

α. Leaves pinnately veined; lateral nerves not numerous or conspicuous.

I. Annual herbs§ 1. *Annu*

II. Biennial or perennial herbs (rarely annual).

1. Stems herbaceous.

* Heads usually radiate; flowers yellow, except in *S. Greenei* and *S. crocatus*.

† Stem leafy to the inflorescence; leaves laciniately pinnatifid to triterately divided.

0. Native species§ 2. *Eremophili*

00. Introduced species ...§ 3. *Jacobaeae*

†† Stem not uniformly leafy to the inflorescence; leaves pinnate or the lower simple and undivided.

0. Leaves pinnate or pinnatisect, rarely undivided§ 4. *Sanguisorboidei*

00. Lower leaves rotund-ovate, simple and undivided§ 5. *Bolanderiani*

††† Stem not uniformly leafy to the inflorescence; leaves simple and entire to lyrate-pinnatifid; plants either quite glabrous from the start or more or less permanently tomentose; pubescence never of long jointed hairs.

0. Plants glabrous or early glabrate; leaves upwardly reduced on the stem...§ 6. *Aurei*

00. Plants at first tomentose, later glabrate; leaves more uniform throughout and mostly pinnately divided§ 7. *Lobati*

000. Plants permanently tomentose or more or less glabrate; stem-leaves upwardly reduced§ 8. *Tomentosi*

†††† Stem leafy to the inflorescence (except in § 9); pubescence usually of long jointed hairs.

0. Stem-leaves not amplexicaul.

δ. Leaves not digitately divided ...§ 9. *Columbiani*

δδ. Leaves digitately divided§ 10. *Digitati*

00. Stem-leaves amplexicaul.

δ. Involucre ecalyculate§ 11. *Cineraroidei*

δδ. Involucre calyculate§ 12. *Amplectentes*

- ** Heads discoid; flowers whitish or purplish.
- † Heads 2 cm. or more high; corollas deeply 5-lobed.....§ 13. *Rugeliae*
- †† Heads 1 cm. high; corollas shortly 5-toothed§ 14. *Mulgedifolii*
- 2. Stems ligneous at the base.
- * Involucre barely calyculate; plants densely white-tomentose throughout§ 15. *Incani*
- ** Involucre calyculate; plants glabrous or pubescent.....§ 16. *Suffruticosi*
- 3. Shrubs or tree-like plants.....§ 17. *Fruticosi*
- β. Leaves palmately veined.....§ 18. *Palmatinerves*
- γ. Leaves pinnately veined; lateral nerves parallel-arcuate, numerous and conspicuous..§ 19. *Multinervi*
- b. Stems abruptly terminated by a fore-shortening of the main axis and bearing at the top two to several, more or less pedunculate axillary compound corymbose cymes; oil-tubes richly developed in the peripheral portion of the stem..§ 20. *Terminales*
- B. Stems climbing§ 21. *Streptothamni*

Subgenus II. PSEUDOGYNOPSIS Greenm. Style-branches terminated by triangular acute or acuminate dorsally hispidulous appendages.....§ 22. *Convolvuloidei*

SUBGENUS I. EUSENECIO Hoffm.

Subgenus I. EUSENECIO Hoffm. in Engl. & Prantl, Nat. Pflanzenf. IV. Abt. 5. 297. 1892; Greenm. Monogr. Senecio, I. Teil, 21, 30. 1901, and in Engl. Bot. Jahrb. 32 : 17, 26. 1902.

Annuals, biennials or perennials; stems erect, scandent or climbing; leaves pinnately or palmately veined; heads radiate or discoid; style-branches truncate or rounded-obtuse, not infrequently bearing a penicillate tuft of hairs at the extreme tip. Sect. 1-21.

SECT. 1. ANNUI Hoffm.

§ 1. ANNUI Hoffm. in Engl. & Prantl, Nat. Pflanzenf. IV. Abt. 5, 297. 1892; Greenm. Monogr. Senecio, I. Teil, 21, 23. 1901, and in Engl. Bot. Jahrb. 32 : 17, 19. 1902. *Obaejacae* DC. Prodr. 6 : 341. 1837.

Annual herbs; heads radiate or discoid; involucre narrowly campanulate or subcylindric, usually calyculate; achenes pubescent or glabrous. Sp. 1-7.

KEY TO THE SPECIES

- A. Heads radiate or discoid; rays when present minute, barely surpassing the involucre.
 - a. Plants viscid-pubescent.....1. *S. viscosus*
 - b. Plants glabrous or pubescent, not viscid.
 - a. Leaves coarsely dentate, auriculate-clasping by a broad base.....2. *S. mohavensis*
 - β. Leaves chiefly pinnatifid, not greatly expanded at the base.
 - I. Bracteoles black-tipped, heads discoid.....3. *S. vulgaris*
 - II. Bracteoles not black-tipped; heads minutely radiate.
 - 1. Plants slightly pubescent.....4. *S. sylvaticus*
 - 2. Plants glabrous.....5. *S. aphanactis*
- B. Heads radiate; rays conspicuous, much surpassing the involucre.
 - a. Plants glabrous or pubescent, not arachnoid-tomentose.
 - a. Leaves thin.....6. *S. californicus*
 - β. Leaves thickish, succulent.....6a. var. *ammophilus*
 - b. Plants arachnoid-tomentose.....7. *S. ampullaceus*

1. ***Senecio viscosus*** L. Sp. Pl. 2 : 868. 1753, and ed. 2, 1217. 1763; Sow. Eng. Bot. *pl.* 32. 1790; Willd. Sp. Pl. 3 : 1984. 1800; Oeder, Fl. Dan. *pl.* 1230. 1799; Schkuhr, Handb. *pl.* 267. 1808; DC. Prodr. 6 : 342. 1837; Gray, Syn. Fl. N. Am. 1² : 394. 1884; Greenm. Monogr. *Senecio*, I. Teil, 23. 1901; in Engl. Bot. Jahrb. 32 : 19. 1902, and in Gray, Manual, ed. 7, 853. 1907; Britton, Manual, ed. 2, 1029. 1905; Britton & Brown, Ill. Fl., ed. 2, 3 : 540. 1913.

Obaejaca viscosa Cass. Diet. Sci. Nat. 35 : 270. 1825.

A strong-scented annual, viscid-pubescent throughout; stem erect, 2 to 4 dm. high, usually branched from the base; leaves sessile, half-clasping, 3 to 6 cm. long, two-thirds as broad, once or twice pinnatifid with angulate-sinuate lobes and rounded sinuses; heads radiate (rarely discoid); rays inconspicuous; achenes glabrous.

Distribution: eastern North America from Nova Scotia to Pennsylvania, near the coast.

Specimens examined:

Nova Scotia: Pictou, 1 Nov., 1874, *Fowler* (Field Mus. Herb.); Pictou Landing, 21 July, 1883, *Macoun* 14883 (Geol. Surv. Canada Herb.); Kentville, 22 Aug., 1902, *Fernald* (Gray Herb. and Geol. Surv. Canada Herb.).

New Brunswick: Schariac, 11 Sept., 1874, *Fowler* (Geol.

Surv. Canada Herb. 14882 and Kew Herb. 872, in part); Painsec Junction, 8 Aug., 1901, *Churchill* (Gray Herb.).

Massachusetts: along Boston and Albany Railroad, Sept., 1879, *Boott* (Gray Herb.); streets of Cambridge, 1 Sept., 1897, *Robinson* (Gray Herb.).

Rhode Island: wharves at Providence, 4 Sept., 1874, *Congdon* (Gray Herb.); streets of Providence, coll. of 1876, *Bailey* (Gray Herb. and Field Mus. Herb.); East Providence, 20 July, 1890, *Collins* (Mo. Bot. Gard. Herb.).

Pennsylvania: on ballast, Girard Point, July, 1877, *Martindale* (Gray Herb.) and Aug., 1877, *Rothrock* (Field Mus. Herb.). Introduced from Europe.

2. **S. mohavensis** Gray, Syn. Fl. N. Am. 1²: 446. 1884, and ed. 2, 454. 1886; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32: 19. 1902. Plate 17.

Glabrous throughout; stems erect or nearly so, 1.5 to 4 dm. high, freely branching; leaves membranous, ovate to oblong-ovate, 2 to 6 cm. long, 1 to 4 cm. broad, apiculate-acute, irregularly toothed, or somewhat laciniate-dentate, the lowermost narrowed into a petiolate base, those of the stem sessile and amplexicaul; inflorescence a terminal corymbose cyme; heads 1 cm. high on slender peduncles, discoid or with much reduced ligulate flowers; involucre calyculate with few short inconspicuous bracteoles, 18–20-flowered; bracts of the involucre about 13, linear, acute, slightly shorter than the flowers of the disk; achenes canescent pubescent.

Distribution: southern California, Arizona, and northern Mexico.

Specimens examined:

California: Pleasant Cañon, Panamint Mountains, alt. 900 m., 10 May, 1906, *Hall & Chandler 6910* (Mo. Bot. Gard. Herb. and Field Mus. Herb.); Hall Cañon, Panamint Mountains, 18 April, 1891, *Coville & Funston 697* (U. S. Nat. Herb.); Panamint Valley, alt. 450 m., 5 May, 1897, *Jones* (Mo. Bot. Gard. Herb.); Mohave region, April–May, 1884, *Lemmon 3129* (Gray Herb.), TYPE; Colorado Desert, April, 1889, *C. R. Orcutt* (U. S. Nat. Herb. and Gray Herb.).

Arizona: Tempe, 21 April, 1892, *Ganong & Blaschka* (Gray Herb.).

Sonora: near the U. S. boundary line, 28 March, 1884, *Pringle* (Gray Herb. and U. S. Nat. Herb.).

3. *S. vulgaris* L. Sp. Pl. 2: 867. 1753, ed. 2, 1216. 1763; Fl. Dan. *pl.* 513. 1770; Willd. Sp. Pl. 3: 1979. 1800; Sow. Eng. Bot. *pl.* 747. 1800; Pursh, Fl. 2: 528. 1814; DC. Prodr. 6: 341. 1837; Reichb. Ic. Fl. Germ. & Helv. 16: 35. *pl.* 68 (CMLIX), *fig. I, 1-9.* 1854; Gray, Syn. Fl. N. Am. 1²: 394. 1886; Greenm. Monogr. Senecio, I. Teil, 23. 1901, in Engl. Bot. Jahrb. 32: 19. 1902, and in Gray, Manual, ed. 7, 853. 1907; Britton, Manual, ed. 2, 1029. 1905; Britton & Brown, Ill. Fl., ed. 2, 3: 539. 1913.

Annual, 1 to 4 dm. high, glabrous or subfloccose pubescent especially in the axils of the upper leaves and in the inflorescence; leaves 2 to 8 cm. long, 0.5 to 2.5 cm. broad, more or less lyrate-pinnatifid and angulate-toothed, lower leaves narrowed into a margined petiole, the upper sessile and semi-amplexicaul; heads discoid; the rather numerous small calyculate bracteoles as well as the bracts of the involucre usually black-tipped; achenes hirtellous-puberulent along the angles or ribs.

Distribution: Labrador, Newfoundland to North Carolina, west to Alaska, California, and New Mexico. Europe, Asia, and Africa.

Specimens examined:

Labrador: Hopedale, 4-6 Aug., 1897, *Sornborger 162* (Gray Herb.).

Newfoundland: rocky hills, St. John's, 1 Aug., 1894, *Robinson & Schrenk* (Gray Herb., U. S. Nat. Herb., Geol. Surv. Canada Herb., and Mo. Bot. Gard. Herb.); Funk Island, 23 July, 1887, *Palmer* (U. S. Nat. Herb.); rich soil, field near shore, Channel, 27 July-1 Aug., 1901, *Howe & Lang 802* (Gray Herb.); Barred Island, 13 Aug., 1903, *Sornborger* (Gray Herb.).

Nova Scotia: dry soil, roadsides, North Sydney, Cape Breton, 21-25 July, 1901, *Howe & Lang 639* (Gray Herb.);

Boylston, July, 1890, *Hamilton 22848* (Geol. Surv. Canada Herb.); Baddeck, Cape Breton Island, 25 July, 1898, *Macoun 19721* (Geol. Surv. Canada Herb.).

New Brunswick: along railroad, Conners, 22 July, 1908, *Mackenzie 3646* (Mo. Bot. Gard. Herb.); Shediac, 11 Sept., 1874, *Fowler 872* in part. (Kew Herb.).

Quebec: shore of St. Lawrence, Gaspé, Matane Co., *Forbes* (Gray Herb.); Gaspé Basin, 24 July, 1882, *Macoun 14889* (Geol. Surv. Canada Herb.).

Ontario: Ottawa, 20 July, 1891, *Scott 14885* (Geol. Surv. Canada Herb.); Belleville, 10 Aug., 1877, *Macoun 14890* (Geol. Surv. Canada Herb.); northeast of Sarnia, Lambton Co., *Wheatley* (Mo. Bot. Gard. Herb.); Wingham, Aug., 1890, *Morton 14886* (Geol. Surv. Canada Herb.); Kingston, Sept., 1896, *Fowler* (Field Mus. Herb.); Sarnia, 18 June, 1901, *Macoun 26677* (Geol. Surv. Canada Herb.).

Saskatchewan: between Cumberland House and Hudson Bay, *Richardson 14887* (Geol. Surv. Canada Herb.); Prince Albert, 13 July, 1896, *Macoun 12174* (Geol. Surv. Canada Herb.).

Alberta: waste ground, Prince's Island, near Calgary, 21 Aug., 1913, *Moodie 31* (Field Mus. Herb.).

British Columbia: Burrard Inlet, 22 July, 1889, *Macoun* (Gray Herb. and Geol. Surv. Canada Herb.); vicinity of Victoria, 9 April, 1908, *Macoun 78949* (Field Mus. Herb.); along railway embankment, Sicamous, 20 July, 1904, *Macoun 62191* (Geol. Surv. Canada Herb.); Cedar Hill, Vancouver Island, 21 May, 1887, *Macoun 14884* (Geol. Surv. Canada Herb.); near Victoria, 23 May, 1893, collector not indicated, *550* (Geol. Surv. Canada Herb.); Victoria, 10 June, 1875, *Dawson 14888* (Geol. Surv. Canada Herb.).

Alaska: vicinity of Sitka, July, 1891, *Wright 1538* (Mo. Bot. Gard. Herb.); Sitka, July, 1881, *McLean* (U. S. Nat. Herb.); Skagway, 29 July, 1907, *Cowles 889* (Field Mus. Herb. and Mo. Bot. Gard. Herb.).

Maine: Baker's Island, 19 July, 1883, *Redfield* (Mo. Bot. Gard. Herb.).

Vermont: waste ground, Rutland, 1 Sept., 1899, *Eggleston 1383* (Gray Herb.).

Massachusetts: Ipswich, *Oakes* (Gray Herb. and U. S. Nat. Herb.); Nahant, 6 July, 1878, *Kellermann* (Mo. Bot. Gard. Herb.); Revere Beach, 9 July, 1898, *Greenman 515* (Gray Herb.); Cambridge, *Chickering* (U. S. Nat. Herb.); roadsides, West Cambridge, 29 Sept., 1894, local collection (Gray Herb.); Swampscott, 21 June, 1897, *Weatherby* (Gray Herb.); Ipswich, July, 1874, *Morong* (Field Mus. Herb.).

Rhode Island: waste places, Providence, Sept., 1844, *Thurber* (Gray Herb.); Providence, 2 July, 1892, *Collins & Bailey* (U. S. Nat. Herb.); Cat Swamp, Providence, 23 June, 1895, *Collins* (U. S. Nat. Herb.); Providence, 16 Aug., 1873, *Congdon* (Field Mus. Herb.); Providence, July, 1878, *Bailey* (Mo. Bot. Gard. Herb.).

New York: Syracuse, June, 1887, *Overacker* (Mo. Bot. Gard. Herb.); Troy, collector and date not indicated (Gray Herb.); Ithaca, 12 Oct., 1892, *H. von Schrenk* (Mo. Bot. Gard. Herb.); near Fiske mansion, Ithaca, 21 May, 1884 (U. S. Nat. Herb.); Hunter's Point, Long Island, Sept., 1879, *J. Schrenk* (U. S. Nat. Herb.); Elmira City, 28 Aug., 1898, *Lucy* (Field Mus. Herb.); Troy, June, 1873, *Jesup* (Field Mus. Herb.).

Pennsylvania: Girard Point, Philadelphia, Aug., 1877, *Rothrock* (Field Mus. Herb.).

New Jersey: Camden, July, 1876, *Martindale* (U. S. Nat. Herb.); Kaighn's Point, Camden, 16 July, 1865, *Parker* (Mo. Bot. Gard. Herb.).

Maryland: vicinity of Oakland, 5 Sept., 1910, *Steele* (U. S. Nat. Herb.).

District of Columbia: waste ground, Washington, 14 Sept., 1891, *Blanchard* (Mo. Bot. Gard. Herb.); above Uniontown, 27 May, 1883, *Ward* (U. S. Nat. Herb.).

North Carolina: cultivated grounds, Biltmore, 4 May, 1897, *Biltmore Herb. 883^b* (Gray Herb., Mo. Bot. Gard. Herb., and Field Mus. Herb.).

Ohio: Oberlin, June, 1892 and 1895, *Ricksecker* (U. S. Nat. Herb.).

Michigan: waste ground, Keweenaw Co., July, 1887, *Farwell* (Gray Herb.).

Wisconsin: St. Croix Co., coll. of 1888, *Matthews* (U. S. Nat. Herb.); Preble, 20 May, 1883, *Schuette* (Field Mus. Herb.); Green Bay, 11 July, 1897 and 29 Sept., 1901, *Schuette* (Field Mus. Herb.).

Nebraska: Valley Co., July, 1886, *Webber* (Field Mus. Herb.).

Montana: Willow Creek, 14 June, 1883 *Scribner 123*^c (Gray Herb.); Columbia Falls, 21 June, 1894, *Williams 965* (Gray Herb. and U. S. Nat. Herb.).

Wyoming: Sundance, 4 July, 1896, *Nelson 2201* (Mo. Bot. Gard. Herb.).

Colorado: valley near Empire, Sept., 1892, *Patterson* (Gray Herb.); along railroad at Georgetown, Aug.-Sept., 1892, *Patterson* (Field Mus. Herb.).

New Mexico: Sante Fe, 14 Sept., 1895, *Mulford 1301* (Mo. Bot. Gard. Herb.); 4 May, 1897, *A. A. & E. G. Heller 3657* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.).

Idaho: frequent in moist places, Julietta, Latah Co., 8 June, 1892, *Sandberg, McDougal & Heller 343* (Gray Herb., Field Mus. Herb., and U. S. Nat. Herb.); waste ground in the Palouse Country and about Lake Coeur d'Alene, June-July, 1892, *Aiton* (Field Mus. Herb. and Mo. Bot. Gard. Herb.).

Washington: on mountains near the lower Cascades, 29 May, 1886, *Suksdorf* (Gray Herb.); Seattle, 6 March, 1889, *Smith* (Mo. Bot. Gard. Herb.); in fields, Pullman, 2 June, 1894, *Piper* (Mo. Bot. Gard. Herb.); Hoquiam, 5 June, 1897, *Lamb 1146* (Field Mus. Herb. and Mo. Bot. Gard. Herb.); San Juan Island, July, 1914, *Reynolds* (Field Mus. Herb.); Index, Snohomish Co., July, 1898, *Savage, Cameron & Lenocker* (Field Mus. Herb.); Granddalles, 3 Sept., 1904, *Westgate 3997* (U. S. Nat. Herb.); Klickitat Co., June, 1878, *Suksdorf* (Gray Herb.).

Oregon: cultivated fields, Sauvie Island, June, 1880, *Howell* (Gray Herb.); Portland, 1 June, 1884, *Henderson 555* (Mo. Bot. Gard. Herb.); Portland, Feb., 1900, *Lunell*, and without date *Sargent* (Gray Herb.); Bonneville, 6 Aug., 1895,

Canby (U. S. Nat. Herb.); Catching Inlet, 10 May, 1911, *Smith 3700* (Field Mus. Herb.); Charleston Bay, 6 May, 1911, *Smith 3668* (Field Mus. Herb.); North Slough, 1 March, 1911, *Smith 3487*; Coos Co., 2 March, 1911, *Smith 3494* (Field Mus. Herb.); Portland, March, 1889, *Drake & Dickson* (Field Mus. Herb.); without definite locality, coll. of 1868–69, *Kellogg & Harford 536* (U. S. Nat. Herb.).

California: Oakland, March, 1864, *Bolander 2777* (Gray Herb. and Mo. Bot. Gard. Herb.) and May, 1865, *Bolander 434* (Gray Herb.); without definite locality, coll. of 1880, *Norton* (Mo. Bot. Gard. Herb.); near Mendocino, May, 1898, *Brown 758* (Mo. Bot. Gard. Herb.); Mendocino Co., June, 1898, *Brown 458* (Field Mus. Herb.); Stanford University, 2 March, 1902, *Baker 311* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); Russian River, near Trenton, 16 March, 1902, *Heller & Brown 5072* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); Big River, Mendocino Co., July, 1903, *McMurphy 374* (U. S. Nat. Herb.); near Saratoga, Santa Clara Co., 25 Feb., 1906, *Pendleton 288* (U. S. Nat. Herb.).

4. *S. sylvaticus* L. Sp. Pl. **2**: 868. 1753, and ed. 2, 1217. 1763; Sow. Eng. Bot. *pl.* 748. 1800; Willd. Sp. Pl. **3**: 1985. 1800; Fl. Dan. *pl.* 869. 1782; DC. Prodr. **6**: 342. 1837; Gray, Syn. Fl. N. Am. **1**²: 394. 1884; Greenm. Monogr. *Senecio*, I. Teil, 23. 1901, in Engl. Bot. Jahrb. **32**: 19. 1902, and in Gray, Manual, ed. 7, 853. 1907; Britton, Manual, ed. 2, 1029. 1905; Britton & Brown, Ill. Fl., ed. 2, **3**: 539. 1913.

Obaejaca sylvatica Cass. Dict. Sci. Nat. **35**: 271. 1825.

Stem erect, simple or branched, 1 to 4 dm. or more high, usually somewhat pubescent; leaves more or less pinnatifid with unequal lobes, 2 to 15 cm. long, 1 to 8 cm. broad; the lower leaves petioled, the upper sessile, clasping and auriculate-sagittate; inflorescence naked or nearly so; heads cylindrical, sparingly calyculate, radiate; ligules barely surpassing the involucre, not infrequently much reduced; achenes canescent-pubescent.

Distribution: Newfoundland to Maine, Ohio, and on Pacific coast.

Specimens examined:

Newfoundland: railway ballast, Whitbourne, 17 Aug., 1894, *Robinson & Schrenk* (Gray Herb., U. S. Nat. Herb., Mo. Bot. Gard. Herb., and Geol. Surv. Canada Herb.).

Prince Edward Island: sand dunes, Tracadie Beach, 25 July, 1901, *Churchill* (Gray Herb. and Mo. Bot. Gard. Herb.); waste places, Brackley Point, 28 Aug., 1888; *Macoun 14874* (Geol. Surv. Canada Herb.).

Nova Scotia: clearings and open woods, Sydney, Cape Breton Island, 17 Aug., 1902, *Fernald* (Gray Herb.); Boylston, Aug., 1890, *Hamilton 22847* (Geol. Surv. Canada Herb.); Truro, without date, *Macculloch* (Gray Herb.); Elizabethtown, Cape Breton Island, 2 Aug., 1898, *Macoun 19719* (Gray Herb. and Geol. Surv. Canada Herb.); Baddeck Bay, Cape Breton Island, 11 Aug., 1898, *Macoun 19720* (Gray Herb. and Geol. Surv. Canada Herb.); sea cliffs, Black Hole, near Baxter's Harbor, 24 Aug., 1902, *Fernald* (Gray Herb.); on pebbly beach, Purcell's Cove, Halifax Harbor, 2-6 Sept., 1901, *Howe & Lang 1512* (Gray Herb.); open woods, Starrs Point, Kings Co., 23 Aug., 1902, *Fernald* (Gray Herb.); McNiels Harbor, Cape Breton Island, 4 Aug., 1898, sheet *19722* (Geol. Surv. Canada Herb.).

New Brunswick: Grand Manan, 26 July, 1891, *Churchill* (Field Mus. Herb. and Mo. Bot. Gard. Herb.); Falls of the St. John River, St. John, 22 July, 1902, *Williams & Fernald* (Gray Herb.).

Quebec: beach of Gaspé Bay, Gaspé Co., 24-27 Aug., 1904, *Collins, Fernald & Pease* (Gray Herb.).

British Columbia: Vancouver Island, 6 Aug., 1909, *Macoun 78950* and *78951* (Field Mus. Herb.).

Maine: island in Penobscot Bay, Aug., 1896, *F. L. & L. H. Harvey 554^e* (U. S. Nat. Herb.).

Ohio: near Painsville, coll. of 1892, *Hacker 123* (Gray Herb.).

Washington: Seattle, Aug., 1909, *Piper* (U. S. Nat. Herb.); on old burn near farms, Port Crescent, Aug., 1911, *Webster 19* (U. S. Nat. Herb.); old camps, Granite Falls, Snohomish Co., 31 Oct., 1911, *Smith 4226* (Field Mus. Herb.); Iron Mountain,

Granite Falls, alt. 300 m., 28 Oct., 1911, *Smith 4224* (Field Mus. Herb.).

Oregon: region of Coos Bay, 10 Sept., 1911, *House 4848* (U. S. Nat. Herb.).

California: Vance's Camp, Humboldt Co., 5 June, 1911, *Smith 3778* (Field Mus. Herb.); vicinity of Eureka, 20 June, 1907, *J. P. Tracy 2571* (Univ. Calif. Herb. and Mo. Bot. Gard. Herb.).

5. *S. aphanactis* Greene, *Pittonia*, 1: 220. 1888, and Fl. Franciscana 464. 1897; Greenm. Monogr. *Senecio*, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32: 19. 1902.

S. sylvaticus Gray, Bot. Calif. 1: 410. 1876, not L.; Jepson, Fl. West. Mid. Calif. 512. 1901.

A slender annual, 1 to 3 dm. high, glabrous or somewhat tomentulose especially in the inflorescence; stem simple or branched; leaves linear to lanceolate, 1 to 4 cm. long, 1 to 12 mm. broad, entire to coarsely dentate or even pinnately lobed, glabrous or nearly so; the lower leaves narrowed into a petiolate base, the upper sessile; inflorescence terminal, few to several-headed; heads somewhat flask-shaped, 6 to 7 mm. high, radiate; involucre sparingly bracteolate, glabrous to tomentulose at the base; rays small, scarcely exceeding the involucre; achenes appressed-canescant.

Distribution: central California, northern Mexico and adjacent islands.

Specimens examined:

California: Mare Island, 30 March, 1874, *Greene* (Gray Herb. and Field Mus. Herb.), co-type; San Luis Obispo, *Brewer 463* (Gray Herb. and Mo. Bot. Gard. Herb.); San Luis Obispo, coll. of 1886, *Summis* (U. S. Nat. Herb.); Avalon, Santa Catalina Island, March, 1901, *Trask* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); edges of cañons and alkaline flats, San Diego, *Brandege 3414* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); San Diego, Geological Survey of California 1860-61, *Cooper* (Gray Herb.); North American Pacific coast flora, *Parry 170* (Gray Herb.); San Diego, 5 Feb., 1884, *Orcutt* (Field Mus. Herb.).

Lower California: Cedros Island, April, 1897, *Brandege* (Gray Herb. and U. S. Nat. Herb.); San Quentin Bay, *Palmer 606* (Kew Herb.).

6. *S. californicus* DC. Prodr. 6 : 426. 1837; Torr. & Gray, Fl. N. Am. 2 : 437. 1843; Gray, Bot. Calif. 1 : 410. 1876, Syn. Fl. N. Am. 1² : 393. 1884, and ed. 2, 454. 1886; Greene, Fl. Franciscana, 465. 1897; Greenm. Monogr. Senecio, I. Teil, 23. 1901 and in Engl. Bot. Jahrb. 32 : 19. 1902; Abrams, Fl. Los Angeles and vicinity 439. 1904.

S. californicus var. *laxior* DC. Prodr. 6 : 426. 1837; Torr. & Gray, Fl. N. Am. 2 : 437. 1843.

S. coronopus Nutt. Trans. Am. Phil. Soc. 7 : 413. 1841; Torr. & Gray, Fl. N. Am. 2 : 437. 1843.

An herbaceous glabrous annual; stem erect simple or branched, 1 to 5 dm. high; leaves oblong-spatulate to lanceolate, entire to subpinnatifid, 2.5 to 7 cm. long, .2 to 2 cm. broad, often reddish; the lower leaves often narrowed to a subpetiolate base, the upper sessile and auriculate-clasping at the base; heads radiate, few to several in a loose cyme; bracts of the involucre about 21, often brownish or black-tipped, much exceeded by the yellow conspicuous rays; achenes canescent-pubescent.

Distribution: central California, vicinity of Monterey, south to northern Mexico.

Specimens examined:

California: sand hills, back of Seaside, Monterey Co., 3 April, 1903, *Heller 6509* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); Gigling Station, east of Del Monte, in sand, 11 May, 1903, *Heller 6710* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); Bardins, Monterey Co., April, 1903, *Elmer 4893* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Del Monte, April, 1902, *Elmer 3576* (Mo. Bot. Gard. Herb.); Arroja Grande, San Luis Obispo Co., 21 Feb., 1886, *Summers* (Gray Herb.); Cuyama, near the boundary between Santa Barbara and San Luis Obispo Counties, 6 May, 1896, *Eastwood* (Gray Herb.); hillsides, Los Angeles Co., 19 March, 1888, *Hasse* (U. S. Nat. Herb.); Los Angeles, May,

1888, *Hasse* (Field Mus. Herb.); copses and grassy slopes, Los Angeles Co., May, 1890, *Hasse* (U. S. Nat. Herb.); Santa Monica, coll. of 1885, *A. Gray* (Gray Herb.); hillsides, Los Angeles Co., Aug., 1890 and June, 1891, *Hasse* (Mo. Bot. Gard. Herb.); "Pueblo los Angeles," *Gambell* (Gray Herb.); without definite locality, *Coulter 335* (Gray Herb.), and coll. of Nov., 1846, *Fremont* (Gray Herb.); Los Angeles, 5 April, 1890, *Fritchey* (Mo. Bot. Gard. Herb.); San Bernardino, *S. B. & W. F. Parish 198* (Field Mus. Herb. and Mo. Bot. Gard. Herb.); San Bernardino, coll. of 1880, *Vasey 330* (Field Mus. Herb., U. S. Nat. Herb., and Gray Herb.); near San Bernardino, May, 1893, *Parish* (Mo. Bot. Gard. Herb.); mesas, San Bernardino Co., May, 1888, *Parish* (Mo. Bot. Gard. Herb.) and April, 1896, *Parish* (Field Mus. Herb.); San Bernardino Co., coll. of 1876, *Parry & Lemmon 206* (Field Mus. Herb. and Mo. Bot. Gard. Herb.); Arrow Head Springs, 15 May, 1891, *Fritchey 18* (Mo. Bot. Gard. Herb.); San Bernardino, *Parish 7* (Gray Herb.); "Cocomurgo," in sandy places, March, 1854, *Bigelow* (Gray Herb.); San Bernardino Co., Feb.-April, 1882, *Parish 233* (Gray Herb.); without definite locality, coll. of 1833, *Douglas 46* (Gray Herb.), CO-TYPE of var. *laxior*; vicinity of Riverside, alt. 600 m., March, 1903, *Hall 3721* (Gray Herb. and Field Mus. Herb.); San Diego, April, 1873, *Bolander & Kellock* (Gray Herb.); San Luis Rey, *Parry* (Gray Herb.); vicinity of Riverside, 26 March, 1907, *Reed 1252* (Field Mus. Herb.); vicinity of San Bernardino, 13 April, 1903, *Parish 5188* (Field Mus. Herb.); without definite locality, *Nuttall* (Gray Herb.); San Diego, April, 1905, *Brandegees* (U. S. Nat. Herb.) and April, 1902, *Brandegees 1647* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); San Diego, April, 1882, *Jones* (U. S. Nat. Herb.); hills, San Diego, 25 April, 1882, *Pringle* (U. S. Nat. Herb. and Field Mus. Herb.); San Diego, 4 May, 1882, *Orcutt 328* (Mo. Bot. Gard. Herb.); Potrero, 6 April, 1889, *Orcutt* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Moro hills, near Fallbrook, 28 April, 1903, *Abrams 3332* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Fallbrook, 27 March, 1882, *Jones 3118* (U. S. Nat. Herb.); San Diego, *Cleveland* (Field

Mus. Herb. and Mo. Bot. Gard. Herb.); San Diego, coll. of June, 1906, *K. Brandegee* (U. S. Nat. Herb.), and coll. of 1875, *Palmer 200* (Field Mus. Herb. and Mo. Bot. Gard. Herb.); side hill, Del Mar, Oct., 1894 and 22 March, 1895, *Angier 14* and *97* (Mo. Bot. Gard. Herb.); Mesa, April, 1895, *Angier* (Field Mus. Herb.); La Jolla, San Diego Co., 17 Feb., 1895, *Snyder* (Field Mus. Herb.); Las Paderes Ranch, San Diego Co., 26 Feb., 1888, *Deane* (Field Mus. Herb.).

Lower California:

Todos Santos Bay, July, 1883, *Orcutt 708* (Gray Herb.); All Saints Bay, May, 1882, *Fish* (Gray Herb.); Punta Bauda, 25 Jan., 1883, *Orcutt 708* (Mo. Bot. Gard. Herb.); Nachoguero Valley, *Schoenfeldt 3401* (U. S. Nat. Herb.).

Var. **ammophilus** (Greene) Greenm. comb. nov.

Senecio ammophilus Greene, Bull. Cal. Acad. **1**:193. 1886.

Leaves thickish, somewhat succulent, 2 to 4 cm. long, .2 to 1.5 cm. broad, the lower oblanceolate subentire, those of the stem auriculate-clasping, pinnately lobed into oblong or linear obtuse lobes.

Lower California: Cape San Quentin, 10 May, 1885, *Greene* (Gray Herb.), CO-TYPE.

The thick leaves of this variety give the plant a somewhat different appearance from typical forms of the species; but an examination of a large suite of specimens shows numerous transitional forms such as those secured by *Fritchey*, *Pringle*, *Bigelow*, *Palmer 200*, *Orcutt 708*, and *K. Brandegee*.

7. S. ampullaceus Hook. Bot. Mag. *pl.* 3487. 1836; DC. Prodr. **6**: 428. 1836; Torr. & Gray, Fl. N. Am. **2**: 440. 1843; Engelm. & Gray, Boston Jour. Nat. Hist. **5**: 250. 1845 (Pl. Lindh. **1**: 42. 1845); Gray Syn. Fl. N. Am. **1**²: 393. 1884, and ed. 2, 1886; Coulter, Contr. U. S. Nat. Herb. **2**: 241. 1892; Greenm. Monogr. *Senecio*, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32**: 19. 1902.

S. ampullaceus var. *glaberrimus* Engelm. & Gray, Boston Jour. Nat. Hist. **5**: 250. 1845 (Pl. Lindh. **1**: 42. 1845).

S. ampullaceus var. *floccosus* Engelm. & Gray, Boston Jour. Nat. Hist. **5**: 250. 1845 (Pl. Lindh. **1**: 42. 1845).

Annual, or occasionally becoming biennial, more or less floccose-tomentose throughout, somewhat glabrate; leaves oblong-obovate, acute to lanceolate and acuminate, 5 to 18 cm. long, 1 to 7 cm. broad, entire to coarsely and irregularly dentate; the lower leaves narrowed below into a winged petiole, those of the stem sessile, semiamplexicaul, gradually smaller towards the few to many headed cymose inflorescence; heads 10 to 12 mm. high, radiate, including the rays 1.5 to 3 cm. in diameter; involucre setaceous-calyculate; bracts of the involucre glabrous; achenes pubescent.

Distribution: eastern Texas.

Specimens examined:

Texas: San Felipe, Austin Co., *Drummond* (Kew Herb. and Gray Herb.), TYPE; Corsicana, *Reverchon* (Mo. Bot. Gard. Herb.); near Richland Station, 13 March, 1880, *Joor* (Mo. Bot. Gard. Herb.); Dawson, 16 April, 1903, *Reverchon 3965* and *5965* (Mo. Bot. Gard. Herb.); Llano, May, 1885, *Reverchon 1545* (U. S. Nat. Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); banks of Pecan Bayou, April, 1882, *Reverchon 81* (Gray Herb. and Mo. Bot. Gard. Herb.); sandy soils, Lampasas Co., May, 1884, *Reverchon 1321* (Mo. Bot. Gard. Herb.); Crabapple, Gillespie Co., *Jermy* (Mo. Bot. Gard. Herb.); Hockley, Harris Co., coll. of 1890, *Thurrow* (Field Mus. Herb.); banks of Colorado River, 4 April, 1914, *Young* (Mo. Bot. Gard. Herb. and Univ. of Texas Herb.); on dry ground, Hempstead, 24 April, 1872, *Hall 369* (Gray Herb., U. S. Nat. Herb., and Mo. Bot. Gard. Herb.); without locality, coll. of 1848, *Wright* (Gray Herb.); Industry, Austin Co., coll. of 1890, *Wurzelow* (Field Mus. Herb.); banks of railroad near Rosenberg, Fort Bend Co., 13 April, 1900, *Eggert* (Mo. Bot. Gard. Herb.); common on prairies, Columbia, 10 April, 1899, *Bush 95* (Gray Herb. and Mo. Bot. Gard. Herb.); Columbia, 23 April, 1900, *Bush 122* (Mo. Bot. Gard. Herb.); Columbia, 25 March, 1900, *Canby, Sargent & Trelease 153* (U. S. Nat. Herb.); on moist prairie between the Brazos and the Colorado Rivers, April, 1844, *Lindheimer 268, 269* (Mo. Bot. Gard. Herb.), co-TYPES of var. *glaberrimus* and *floccosus*.

SECT. 2. EREMOPHILI Greenm.

§ 2. EREMOPHILI Greenm. Monogr. Senecio, I. Teil, 21, 23. 1901, and in Engl. Bot. Jahrb. **32** : 17, 19. 1902.

Annual or biennial herbs, not infrequently becoming perennial by the development of a ligneous base; stems leafy; leaves laciniately pinnatifid; inflorescence a terminal corymbose or paniculate cyme; heads radiate, rays conspicuous; achenes glabrous or pubescent. Sp. 8-13.

KEY TO THE SPECIES

- A. Plants glabrous; achenes smooth or slightly hirtellous.
 - a. Heads 7 to 10 mm. high; involueral bracts 5 to 7 mm. long, usually conspicuously black-tipped.
 - α. Involucre 3 to 5 mm. in diameter, 20-35-flowered. 8. *S. MacDougalii*
 - β. Involucre 5 to 6 mm. in diameter, 35-50-flowered. 9. *S. ambrosioides*
 - b. Heads 10 to 12 mm. high; involueral bracts 7 to 10 mm. long, not conspicuously black-tipped.
 - α. Northern species (Canada and the U. S.) 10. *S. eremophilus*
 - β. Southern species (Mexico) 11. *S. Townsendii*
- B. Plants more or less tomentose; achenes canescent-pubescent.
 - a. Leaves at first tomentulose, later glabrate. 12. *S. chihuahuensis*
 - b. Leaves permanently tomentulose. 13. *S. durangensis*

8. **S. MacDougalii** Heller, Bull. Torr. Bot. Club **26** : 592. 1899; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32** : 19. 1902, in part; Rydb. in Fl. Colo. 397. 1906, in part; Wootton & Standley, Contr. U. S. Nat. Herb. **19** : 745. 1915.

S. eremophilus Gray, Syn. Fl. N. Am. **12** : 392. 1884, and ed. 2, 1886, in part, not Richards.

S. eremophilus var. *attenuatus* Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32** : 19. 1902.

Glabrous throughout or slightly puberulent above; stem simple or branched, 5 to 8 dm. high, leafy to the inflorescence; leaves more or less laciniately pinnatifid, 3 to 10 cm. long, 1.5 to 5 cm. broad, segments linear to lanceolate, entire to coarsely and unequally dentate; inflorescence terminating the stem and branches in corymbose cymes; heads 7 to 10 mm. high, radiate; involucre narrowly campanulate, calyculate, 3 to 5 mm. in diameter; bracts of the involucre usually 13 (8-13), linear-

lanceolate, 4 to 5 mm. long, commonly black-tipped; ray-flowers 5 to 8, light yellow; disk-flowers 14 to 30; achenes glabrous or slightly puberulent.

Distribution: New Mexico and Arizona.

Specimens examined:

New Mexico: Santa Fe Cañon, Aug., 1880, *Snow* (Mo. Bot. Gard. Herb.); Santa Fe Creek, 9 Sept., 1881, *Engelmann* (Mo. Bot. Gard. Herb.); Santa Fe, 14 Aug., 1895, *Mulford 1292* (Mo. Bot. Gard. Herb.); near Pecos, alt. 2040 m., 25 Aug., 1908, *Standley 5311* (Mo. Bot. Gard. Herb.); Pecos River National Forest, alt. 2560 m., 10 Aug., 1908, *Standley 4873* (U. S. Nat. Herb.); White Mountains, alt. 2130 m., 6 Aug., 1897, *Wooton 290* (Gray Herb. and Mo. Bot. Gard. Herb.); White Mountains, alt. 2255 m., 25 Aug., 1907, *Wooton & Standley 3672* (U. S. Nat. Herb.); head of Bear Creek, coll. of 1903, *Plummer* (U. S. Nat. Herb.); Gilmore's Ranch, White Mountains, alt. 2280 m., 23 Sept., 1906, *Standley* (Mo. Bot. Gard. Herb.); G. O. S. Ranch, Grant Co., 27 Aug.-12 Sept., 1911, *Holzinger* (U. S. Nat. Herb.).

Arizona: Walnut Cañon, alt. 2130 m., *MacDougal 342* (Gray Herb. and Field Mus. Herb.), co-TYPE; near Flagstaff, May-Oct., 1900, *Purpus* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Mt. Agassiz, alt. 3050 m., 10 Sept., 1909, *Pearson 315* (U. S. Nat. Herb.); Humphrey Peak, July, 1883, *Rusby 337* (Gray Herb. and Field Mus. Herb.); Barfoot Park, Chiricahua Mountains, 24 Oct., 1906, *Blumer 1484* (U. S. Nat. Herb. and Field Mus. Herb.); Huachuca Mountains, Sept., 1882, *Lemmon 2785* (Gray Herb., U. S. Nat. Herb., and Field Mus. Herb.); Huachuca Mountains, 17 Oct., 1903, *Mearns 2581* (U. S. Nat. Herb.).

9. *S. ambrosioides* Rydb. Bull. Torr. Bot. Club **37**: 467. 1910; Wooton & Standley, Contr. U. S. Nat. Herb. **19**: 745. 1915.

S. eremophilus Gray, Pl. Fendl. 108. 1849, as to plant of Fendler; Pac. Rail. Rept. **4**: 111. 1856, as to plant of Bigelow; Syn. Fl. N. Am. **1**²: 392. 1884, and ed. 2. 1886, in part, not

Richards.; Nelson, in Coulter & Nelson, Manual Cent. Rocky Mountains, 583. 1909, in part, not Richards.

S. MacDougalii Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32**: 19. 1902, in part, not Heller; Rydb. Fl. Colo. 397. 1906, in part, not Heller.

Herbaceous perennial, glabrous or essentially so throughout; stems one to several from a ligneous base, 3 to 5 dm. high; leaves oblanceolate to ovate-lanceolate in general outline, 3 to 13 cm. long, 1 to 5 cm. wide, more or less laciniately pinnatifid into linear to lanceolate, entire to coarsely and unequally dentate divisions; inflorescence a terminal corymbose cyme; heads usually numerous, 7 to 10 mm. high, radiate; involucre subcampanulate, 5 to 7 mm. in diameter, calyculate; bracts of the involucre usually 13, linear-lanceolate, 5 to 7 mm. long, commonly black-tipped; ray-flowers 5 to 8; disk-flowers 30 to 45; achenes hirtellous-puberulent.

Distribution: Wyoming to New Mexico, Idaho, and Arizona.

Specimens examined:

Wyoming: gravelly banks, Centennial Mountain, Albany Co., 2 Aug., 1902, *Nelson 8773* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); moist ground in open woods, Centennial, 27 July, 1900, *Nelson 7717* (Gray Herb. and Mo. Bot. Gard. Herb.); Bridger Peak, Carbon Co., 22 Aug., 1903, *Goodding 1942* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.).

Colorado: Chamber's Lake, alt. 2895 m., 13 Sept., 1896, *Baker* (Mo. Bot. Gard. Herb.); cañon west of Palmer Lake, alt. 2435 m., 12 Aug., 1896, *Crandall* (Mo. Bot. Gard. Herb.); Steamboat Springs, 20 July, 1903, *Goodding 1617* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Boulder, coll. of 1908, *Pace* (Mo. Bot. Gard. Herb.); Denver, 8 Sept., 1905, *Moffat* (Mo. Bot. Gard. Herb.); Georgetown, 19 Aug., 1895, *Shear 4720* (U. S. Nat. Herb.), coll. of 19 July, 1886, *Trelease*, and coll. of 26 July, 1886, *Letterman* (Mo. Bot. Gard. Herb.); Rocky Mountains, Powell's Colorado Exploring Expedition 1868, *Vasey 337* (Gray Herb.); Golden City, 18 Aug., 1870, *Greene 230* (Gray Herb.); Silver Plume, 21 Aug., 1895, *Shear 4999* (U. S. Nat. Herb.); Manitou, Aug., 1881, *Fritchey 14*, in part, and coll. of 16 Aug., 1884, *Letterman* (Mo. Bot. Gard. Herb.);

Ruxton Park, alt. 2700 m., 21 Aug., 1901, *F. E. & E. S. Clements 152* (Gray Herb., U. S. Nat. Herb., and Mo. Bot. Gard. Herb.); Breckenridge, coll. of 1887, *Bereman* (Mo. Bot. Gard. Herb.); Breckenridge, coll. of 1892, *Wislizenus 1063* (Mo. Bot. Gard. Herb.); Oro City, 23 July, 1873, Hayden's U. S. Geol. Survey, *Coulter*, in part (U. S. Nat. Herb.); Green Mountain Falls, alt. 2560 m., 2 Aug., 1892, *Sheldon 485* (U. S. Nat. Herb.); Hotchkiss, alt. 1585 m., 30 June, 1892, *Cowen 287* (U. S. Nat. Herb.); Oak Creek, Fremont Co., Aug., 1873, *Brandeggee 716* (Mo. Bot. Gard. Herb.); Gunnison, 25 July, 1901, alt. 2300 m., *Baker 596* (Gray Herb. and Mo. Bot. Gard. Herb.); vicinity of Mount Carbon, Gunnison Co., alt. 2730–2800 m., 4 July and 10 Aug., 1910, *Eggleston 5835* and *6159* (U. S. Nat. Herb.); Pandora, 10 Aug., 1901, *Baker 748* (Gray Herb. and Mo. Bot. Gard. Herb.); Taylor River, 15 Aug., 1873, Hayden's U. S. Geol. Survey, *Coulter* (U. S. Nat. Herb.); Telluride, alt. 2740–3600 m., Aug., 1894, *Tweedy 354* (U. S. Nat. Herb.); Ute Pass, 2 July, 1896, *Shear 3695* (U. S. Nat. Herb.); near Pagosa Peak, alt. 3050 m., 8 Aug., 1899, *Baker 706* (Gray Herb., U. S. Nat. Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); Saguache Creek, Sept., 1873, Wheeler Expedition, *Wolf 1086* (U. S. Nat. Herb.); Parrott City, alt. 2740 m., *Baker, Earle & Tracy 475* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); northeast corner of North Park, 3 Aug., 1874, *Barber* (U. S. Nat. Herb.); Twin Lakes, Wheeler Expedition, 1873, *Wolf & Rothrock 562* (Gray Herb., and Field Mus. Herb.); Rocky Mountains, coll. of 1862, *Hall & Harbour 327* (Gray Herb. and Field Mus. Herb.), also coll. of 1861–62, *Parry 26* (Gray Herb. and Mo. Bot. Gard. Herb.); mouth of Bear Creek Cañon, 23 Aug., 1915, *Drushel & Dougan* (Drushel Herb.); upper Clear Creek Valley, alt. 3050 m., 10 Aug., 1874, *Engelmann* (Mo. Bot. Gard. Herb.); Leadville, 8 July, 1886, *Trelease* (Mo. Bot. Gard. Herb.); Tolland, alt. 2895 m., 29 July, 1913, *Overholts* (Mo. Bot. Gard. Herb.); near Breckenridge, alt. 2950 m., Aug., 1901, *Mackenzie 208* (Mo. Bot. Gard. Herb.); Penn's Gulch, near Sunset, 30 July, 1886, *Letterman* (Mo. Bot. Gard. Herb.).

New Mexico: pine forest, Jicarilla Apache Reservation,

near Dulce, alt. 2150–2470 m., 20 Aug., 1911, *Standley 8183* (U. S. Nat. Herb.); Chama, 8 Sept., 1899, *Baker* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Santa Fe Cañon, 3 Oct., 2380–2850 m., 8 July, 1911, *Standley 6564* (U. S. Nat. Herb.); Navajo Indian Reservation in the Tunitcha Mountains, 8 Aug., 1911, *Standley 7591* (U. S. Nat. Herb.); mountains near Las Vegas, July, 1881, *Vasey* (U. S. Nat. Herb.); Santa Fe Cañon, 7 July, 1897, alt. 2440 m., *A. A. & E. G. Heller 3819* (Gray Herb. and Mo. Bot. Gard. Herb.); Santa Fe Cañon, 3 Oct., 1913, *Rose, Fitch & Parkhurst 17714* (U. S. Nat. Herb.); Canoncinto, Santa Fe Co., coll. of 1879, *Brandeggee 12078* (Mo. Bot. Gard. Herb.); creek bottom, Santa Fe, 20 Oct., 1846, *Fendler 475* (Gray Herb. and Mo. Bot. Gard. Herb.); Balsam Park, Sandia Mountains, alt. 2500 m., Aug.–Sept., 1914, *Ellis 281* (Mo. Bot. Gard. Herb.); Pecos River Indian Reservation, 6 Aug., 1898, *Coghill 144* (Mo. Bot. Gard. Herb.); Mineral Creek, Sierra Co., alt. 2130 m., 26 Sept., 1904, *Metcalf 1415* (U. S. Nat. Herb.); Santa Antonita, Whipple's Exploration 1853–54, *Bigelow* (U. S. Nat. Herb. and Gray Herb.); Organ Mountains, alt. 2130 m., 23 Sept., 1906, *Wootton & Standley* (U. S. Nat. Herb.).

Utah: Big Cottonwood Cañon, Salt Lake Co., alt. 2774 m., 10 Aug., 1905, *Garrett 1591* (U. S. Nat. Herb.); Tate Mine, Marysville, alt. 2740 m., 22 Aug., 1894, *Jones 5858* (Mo. Bot. Gard. Herb.); Bromide Pass, Henry Mountains, alt. 3050 m., 27 July, 1894, *Jones 5695^{ad}* (U. S. Nat. Herb.); slope of Aquarius Plateau, alt. 2750 m., 2 Aug., 1875, *Ward 499* (U. S. Nat. Herb.).

Arizona: Navajo Indian Reservation, about the north end of the Carrizo Mountains, 29 July, 1911, *Standley 7376* (U. S. Nat. Herb.).

Among the specimens here cited, a few, particularly Parry's 26, Overholts', Mackenzie's 208, and Engelmann's plant from Upper Clear Creek Valley, might be almost equally well referred to the preceding species, *S. MacDougalii*, to which *S. ambrosioides* is very closely related; but in general the latter may be distinguished by the slightly larger and more numer-

ously flowered heads and usually, but not always, less pinnatisect leaves.

10. *S. eremophilus* Richards. in App. Frankl. 1st Journ. 31. 1823; Hook. Fl. Bor. Am. 1 : 334. 1840; Torr. & Gray, Fl. N. Am. 2 : 444. 1843; Eaton, Bot. King Exp. 191. 1871, in part; Gray, Syn. Fl. N. Am. 1² : 392. 1884, and ed. 2, 1886; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32 : 19. 1902; Nelson in Coulter & Nelson, Manual Cent. Rocky Mountains 583. 1909, in part.

S. pembrinensis Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32 : 19. 1902.

An herbaceous perennial, glabrous or slightly puberulent in the inflorescence; stems erect, 3 to 8 dm. high, striate; leaves more or less laciniately pinnatifid with linear, lanceolate or oblong, entire or coarsely and unequally dentate divisions; the lower leaves petiolate, the upper sessile; inflorescence terminating the stem in a somewhat leafy corymbose or paniculate cyme; heads rather large, 10 to 12 mm. high, radiate; involucre campanulate conspicuously calyculate; bracts of the involucre usually 13, linear-lanceolate, acute, 7 to 9 mm. long, glabrous, minutely brownish- or black-tipped; ray-flowers 8 to 10; disk-flowers 40 to 60; achenes ribbed, glabrous, or slightly hirtellous-puberulent.

Distribution: northwestern Canada to Nebraska, Colorado, and Utah.

Specimens examined:

Saskatchewan: Lipton, 11 Aug., 1911, *Clokey 1844* (Mo. Bot. Gard. Herb.); Qu'Appelle River, Assiniboia, Aug., 1883, *Macoun 14839* (Geol. Surv. Canada Herb. and U. S. Nat. Herb.); near Prince Albert, 10 July, 1896, *Macoun 12171* (Geol. Surv. Canada Herb.); in damp thickets north of Saskatchewan River, 22 Aug., 1872, *Macoun 14841* (Geol. Surv. Canada Herb.); Saskatchewan Plains, *Macoun 868* (Kew Herb.).

Alberta: "on gravelly banks of Cedar Lake, Lat. 54°," *Richardson* (Kew Herb.), TYPE; Pembina, coll. of 1873, *Coues* (Gray Herb.); on damp banks, Bow River at Morley, 6 Sept.,

1879, *Macoun 14840* (Geol. Surv. Canada Herb.); Dunvegan, Peace River, 17 Aug., 1879, *Dawson 26686* (Geol. Surv. Canada Herb.); Athabasca Plains, 14 Sept., 1872, *Macoun 1040* (Gray Herb. and Kew Herb.).

South Dakota: Sylvan Lake, 27 Aug., 1897, *Griffiths* (Mo. Bot. Gard. Herb.).

Nebraska: mountain range, south of White Clay Creek, 23 Aug., 1859, Lieut. F. T. Bryan's Expedition, 1856, *H. Engelmann* (Mo. Bot. Gard. Herb.).

Wyoming: on the summits of Big Horn Mountains, Aug., 1859, Reynolds' Expedition to the headwaters of the Missouri and Yellowstone Rivers, *Hayden* (Mo. Bot. Gard. Herb.); Laramie Mountains, *Hayden* (Gray Herb. and Mo. Bot. Gard. Herb.); Laramie Mountains, 17 Aug., 1899, *Schuehnt* (U. S. Nat. Herb.).

Colorado: Cascade Cañon, July, 1880, *Eurney* (Mo. Bot. Gard. Herb.); Rocky Mountains, *Hall & Harbour 327*, in part (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Pike's Peak, alt. 3050 m., 25 Aug., 1915, *Drushel & Dougan* (Drushel Herb.); Manitou, Aug., 1881, *Fritchey 14* in part (Mo. Bot. Gard. Herb.), form.

var. **Kingii** (Rydb.) Greenm. comb. nov.

Senecio Kingii Rydb. Bull. Torr. Bot. Club **37**: 468. 1910.

S. eremophilus Eaton, Bot. King Exp. 191. 1871, as to plant of Watson.

S. Watsoni Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32**: 19. 1902.

Leaves oblanceolate to oblong-lanceolate, coarsely dentate to pinnatisect with relatively broad divisions; but through several specimens connecting directly with the above species.

Specimen examined:

Utah: Cottonwood Cañon, alt. 2590 m., Aug., 1869, *Watson 676* (Columbia Univ. Herb. and Gray Herb.), TYPE.

11. **S. Townsendii** Greenm.¹

Herbaceous perennial, glabrous throughout; stem 6 to 10 dm. high, striate, often purplish; leaves coarsely, unequally

¹ *Senecio Townsendii* Greenm. sp. nov., herbaceous perennis ubique glabrus; caule 6-10 dm. alto, striato saepe purpurascenti; foliis inaequaliter et remote

and remotely dentate to laciniately pinnatifid, oblanceolate to oblong-lanceolate in general outline, 3 to 10 cm. long, 1 to 4 cm. broad, divisions linear and entire to dentate, acute or obtuse; lower leaves petiolate, the upper sessile; inflorescence a loose several to many-headed corymbose cyme; heads 10 to 13 mm. high, radiate; involucre narrowly campanulate, calyculate, glabrous; bracts of the involucre commonly 13, linear-lanceolate, 8 to 10 mm. long, terminated by a small black or brownish penicillate tip; flowers pale yellow; ray-flowers 5 to 8, occasionally much reduced; disk-flowers 35 to 50; achenes glabrous.

Distribution: northern Mexico.

Chihuahua: near Colonia San Garcia in the Sierra Madre, alt. 2285 m., 9 Sept., 1899, *Townsend & Barber 317* (Mo. Bot. Gard. Herb., Gray Herb., and U. S. Nat. Herb.), TYPE; Mound Valley, Sierra Madre Mountains, alt. 2130 m., 18 Sept., 1903, *Jones* (U. S. Nat. Herb.).

The Townsend and Barber specimens have been distributed as "*Senecio Chihuahuanus* Wats." and the Jones plant was distributed as "*Senecio eremophilus*" under which names they may be looked for in herbaria.

12. *S. chihuahuensis* Watson, Proc. Am. Acad. **23**: 280. 1888; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32**: 19. 1902.

An herbaceous perennial; stem erect, 4 to 5 dm. high from a rather slender rootstock, striate-angulate, somewhat purplish; early leaves oblanceolate, 3 to 5 cm. long, 1 cm. broad, laciniately dentate, arachnoid-tomentulose on both surfaces; later stem-leaves short-petiolate, or subsessile, oblong-ovate in general outline, about 8 cm. long, one-half to two-thirds as

grosse-dentatis vel laciniato-pinnatis, oblanceolatis vel oblongo-lanceolatis in circumscriptione, 3-10 cm. longis, 1-4 cm. latis; laciniis linearibus et integris vel dentatis acutis vel obtusis; foliis inferioribus petiolatis, superioribus sessilibus; inflorescentibus laxe corymboso-cymosis multicapitatis; capitulis 10-13 mm. altis, radiatis; involucri anguste campanulatis calyculatis glabris; bracteis involucri 13 lineari-lanceolatis 8-10 mm. longis minute atro- vel fulvo-penicillatis; floribus pallide aurantiabus; floribus femineis 5-8 nonnunquam multo reductis; floribus disci 35-50; achaeniis striatis glabris.—Near Colonia San Garcia in the Sierra Madre, State of Chihuahua, Mexico, alt. 2285 m., 9 Sept., 1899, *Townsend & Barber 317* (Mo. Bot. Gard. Herb., Gray Herb., and U. S. Nat. Herb.), TYPE; Mound Valley, Sierra Madre Mountains, alt. 2135 m., 18 Sept., 1903, *Jones* (U. S. Nat. Herb.).

broad, subbipinnate, at first tomentulose, later becoming glabrous or essentially so, divisions narrow, unequal, cartilaginous-apiculate; inflorescence a terminal corymbose cyme; heads 10 to 12 mm. high, radiate; involucre cylindric-campanulate, calyculate with short linear subulate bracteoles; bracts of the involucre 7 to 9 mm. long, brownish- or black-tipped, shorter than the numerous flowers of the disk; ray-flowers about 8; achenes canescent-pubescent.

Distribution: northern Mexico.

Specimens examined:

Chihuahua: ledges of the Sierra Madre, alt. 2955 m., 7 Oct., 1887, *Pringle 1318* (Gray Herb., Kew Herb., and Mo. Bot. Gard. Herb.), TYPE.

13. *S. durangensis* Greenm. Field Col. Mus. Bot. Ser. 2 : 275. 1907. Plate 18.

S. ctenophyllus Greenm. Proc. Am. Acad. 43 : 20. 1907, not Phil.

An herbaceous annual, or becoming perennial by the development of a ligneous base; stem simple or branched, erect, 3 to 4 dm. high, arachnoid-tomentose; leaves lanceolate, 2 to 9 cm. long, 1 to 2.5 cm. wide, more or less pinnately divided, permanently arachnoid-tomentulose on both surfaces, lower leaves petiolate, upper sessile; inflorescence a terminal tomentulose corymbose cyme; heads numerous, 8 to 10 mm. high, radiate, calyculate; involucre campanulate, glabrous or nearly so; bracts of the involucre 13, linear-lanceolate, 5 to 6 mm. long, minutely black-tipped, penicillate; ray-flowers 5 to 8, ligules pale yellow; disk-flowers 20 to 30; achenes canous-hirtellous.

Distribution: northern Mexico.

Specimen examined:

Durango: barranca, below Sandia Station, alt. 2135 m., 15 Oct., 1905, *Pringle 10105* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.), TYPE.

SECT. 3. JACOBÆAE DC.

§ 3. JACOBÆAE DC. Prodr. 6 : 348. 1837; Hoffm. in Engl. & Prantl, Nat. Pflanzenf. IV, Abt. 5, 297. 1892; Greenm.

Monogr. *Senecio*, I. Teil, 21, 23. 1901, and in Engl. Bot. Jahrb. 32 : 17, 19. 1902.

Biennial or perennial herbs with lyrate or 2-3-pinnatisect leaves and radiate heads. Sp. 14-16.

KEY TO THE SPECIES

- A. Stem and leaves glabrous or nearly so; involu-
 ucal bracts narrow, about 1 mm. broad;
 bracteoles usually black-tipped..... 14. *S. rupestris*
- B. Stems and leaves more or less permanently
 floccose-tomentulose; involueral bracts 1.5 to
 2 mm. broad; bracteoles not black-tipped.
 - a. Upper stem-leaves once pinnate..... 15. *S. erucifolius*
 - b. Upper stem-leaves 2-3-pinnatisect..... 16. *S. Jacobaea*

14. *S. rupestris* Waldst. & Kit. Descr. et Ic. Pl. Rar. Hung. 2 : 136. *pl.* 128. 1805; Reichb. Ic. Crit. 4 : 28. *pl.* 334. *fig.* 514. 1826; Strobl, Fl. Admont. 1 : 57. 1881, and in Flora 65 : 478, 479. 1882; von Hayek, Fl. Stierm. 2 : 564. 1913.

S. laciniatus Bert. in Desv. Jour. Bot. 2 : 76. 1813; Amoen. Ital. 102, 408. 1819.

Senecio nebrodensis var. *glabratus* DC. Prodr. 6 : 350. 1837.

Annual or biennial, sometimes becoming perennial, glabrous throughout or slightly pubescent; stem erect, 3 to 6 dm. high, simple or branched, striate; leaves lanceolate to obovate-lanceolate in general outline, 3 to 10 cm. long, 1 to 4 cm. broad, laciniately lobed or subpinnatiscent, thin in texture, the lobes again sharply dentate; the lower leaves narrowed into a subpetiolate base, the upper sessile and semiamplexicaul; inflorescence a terminal corymbose cyme; heads 8 to 10 mm. high, radiate; involucre calyculate with black-tipped bracteoles; bracts of the involucre about 21, linear-lanceolate, acute, 6 to 7 mm. long; ray-flowers about 13; disk-flowers numerous; achenes glabrous or slightly hirtellous.

Distribution: on ballast near Philadelphia. Introduced from Europe.

Specimen examined:

Pennsylvania: on ballast, Philadelphia, July, 1880, *Martindale* (Gray Herb.).

15. *S. erucifolius* L. Fl. Suecica, ed. 2, 291. 1755; Huds. Fl. Ang. 366. 1798; DC. Prodr. 6 : 351. 1837; Reichb. Ic. Fl.

Germ. & Helv. **16**: 38. *pl.* 75 (CMLXVI). *fig.* 1. 1854; Cosson & Saint-Pierre, Fl. Paris, ed. 10, 518. 1861. Beck von Managetta, Fl. Nieder-Oesterr. 1221. 1893.

An herbaceous biennial or perennial, more or less floccose-tomentulose throughout and on the stem and lower leaf-surface often intermixed with hirsute hairs; stems erect, 3 to 10 dm. high, simple or branched; leaves lyrate-pinnatifid to pinnatisect, 2 to 10 cm. long, 1 to 6 cm. broad, the lobes subentire, blunt, and submucronate to sharply dentate; lowermost leaves narrowed into a subpetiolate base, the upper sessile and semiamplexicaul; inflorescence a terminal few- to many-headed corymbose cyme; heads about 1 cm. high, radiate; involucre campanulate, calyculate; bracts of the involucre usually 13, lanceolate-oblong, 4 to 5 mm. long, glabrous or slightly floccose-tomentulose, with rather broad scarious margins; ray-flowers about 13; disk-flowers numerous, 50 to 60; achenes hirtellous.

Distribution: on ballast near Philadelphia. Introduced from Europe.

Specimens examined:

Pennsylvania: on ballast, Philadelphia, 30 Aug., 1879, Parker (Gray Herb.).

New Jersey: on ballast, Kaighn's Point, Burk (Field Mus. Herb.).

16. S. Jacobaea L. Sp. Pl. **2**: 870. 1753; Willd. Sp. Pl. **3**: 1997. 1800; DC. Prodr. **6**: 350. 1837; Sm. & Sow. Eng. Bot. **16**: *pl.* 1130. 1803; Schkuhr, Handb. *pl.* 267. 1808; Reichb. Ic. Fl. Germ. & Helv. **16**: 38. *pl.* 73 (CMLXIV). *figs.* II. 3, 4. 1854; Gray, Syn. Fl. N. Am. **1**²: 383. 1884, and ed. 2, 1886; Britton, Manual, ed. 2, 1029. 1905; Gray, Manual, ed. 7, 853. 1907; Britton & Brown, Ill. Fl., ed. 2, **3**: 542. 1913.

Jacobaea vulgaris Vahl in Fl. Dan. **6**: *pl.* 944. 1787; Gaertn. Fruct. **2**: 445. *pl.* 170. *fig.* 1. 1791. An erect, biennial or perennial herb, 3 dm. or more high, at first usually arachnoid-tomentulose, more or less glabrate; basal leaves petiolate, somewhat lyrate; stem leaves sessile, semiamplexicaul, ovate-oblong in general outline, 3 to 15 cm. long, 1.5 to 7 cm.

broad, 2-3-pinnatisect; inflorescence a terminal corymbose cyme; heads numerous, radiate; achenes pubescent.

Distribution: Newfoundland to New Jersey, occurring along roadsides, in pastures, and on ballast. Introduced from Europe.

Specimens examined:

Newfoundland: roadsides, St. John's, 7-19 Aug., *Robinson & Schrenk* (Gray Herb., U. S. Nat. Herb., Geol. Surv. Canada Herb., and Mo. Bot. Gard. Herb.).

Nova Scotia: L'Ardoire, Cape Breton Island, Aug., 1892, *Faxon* (Gray Herb.); Sydney and Mira Bay, Cape Breton Island, 17 Aug., 1898, *Macoun 19723* (Geol. Surv. Canada Herb.); eastern Nova Scotia, 16 Aug., 1890, *Chickering* (U. S. Nat. Herb.); Boyston, *Hamilton 22844* (Geol. Surv. Canada Herb.); Pictou, 1 Nov., 1874, *Fowler* (Field Mus. Herb.); Pictou Landing, 24 July, 1883, *Macoun 14859* (Geol. Surv. Canada Herb.); pasture, Windsor Junction, 11 July, 1901, *Howe & Lang 427* (Gray Herb.); pasture, near Pictou, 12-18 July, 1901, *Howe & Lang 540* (Gray Herb.).

Prince Edward Island: Tignish, 26 July, 1888, *Macoun, 14858* (Geol. Surv. Canada Herb.); Tracadie Beach, 27 July, 1901, *Churchill* (Gray Herb. and Mo. Bot. Gard. Herb.).

New Brunswick: Miramichi, *Fowler* (Gray Herb. and U. S. Nat. Herb.); near railroad station, Anagance, 19 July, 1901, *Churchill* (Gray Herb. and Mo. Bot. Gard. Herb.).

Quebec: on ballast-filling about fish houses, York, Gaspé Co., 25 Aug., 1904, *Collins, Fernald & Pease* (Gray Herb.).

Ontario: Burlington, 23 Aug., 1883, *Burgess 14857* (Geol. Surv. Canada Herb.).

Pennsylvania: on ballast, July, 1876, *Martindale* (Mo. Bot. Gard. Herb.).

New Jersey: on ballast, Camden, coll. of 1878, *Martindale* (Gray Herb., U. S. Nat. Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); on ballast, Kaighn's Point, *Burk* (Field Mus. Herb.).

SECT. 4. *SANGUISORBOIDEI* Greenm.

§ 4. *SANGUISORBOIDEI* Greenm. Monogr. *Senecio*, I. Teil, 22,

23, 1901, and in Engl. Bot. Jahrb. **32**: 18, 19. 1902. *Lobati* Rydb. Bull. Torr. Bot. Club **27**: 169. 1900, in part.

Annuals, biennials, or perennials, often forming merely a rosette of leaves during the first year; stems erect, 1.5 to 10 dm. high from a distinctly annual root or from a rather stout rootstock; leaves once, twice, or thrice pinnately divided; heads numerous; achenes glabrous or pubescent. Sp. 17-29.

KEY TO THE SPECIES

- A. Annuals or biennials.
 - a. Bracts of the involucre usually 13, linear-lanceolate, 1 to 2.5 mm. broad 17. *S. sanguisorboidea*
 - b. Bracts of the involucre usually 21, linear or linear-lanceolate, 0.5 to 1.5 mm. broad.
 - a. Lateral leaf-segments not abruptly contracted into a narrow base.
 - I. Plants of southeastern United States.....18. *S. glabellus*
 - II. Plants of southwestern Texas and northern Mexico.....19. *S. Greggii*
 - β. Lateral leaf-segments abruptly contracted into a narrow base.....20. *S. imparipinnatus*
- B. Perennials; upright stem from a horizontal, ascending or suberect rootstock.
 - a. Leaves 2-3-pinnatisect; segments narrow....21. *S. Millefolium*
 - b. Leaves once pinnate; segments narrowly obovate to subreniform.
 - a. Heads numerous, small, 5 to 10 mm. high.
 - I. Involucral bracts usually 21.
 - 1. Leaves glabrous; achenes hirtellous.....22. *S. tampicanus*
 - 2. Leaves pubescent beneath; achenes glabrous.....23. *S. hypotrichus*
 - II. Involucral bracts usually 13.
 - 1. Lateral leaf-divisions longer than broad.
 - * Midrib glabrous 24. *S. Sanguisorbae*
 - ** Midrib floccose-tomentulose.... 25. *S. pinnatisectus*
 - 2. Lateral leaf-divisions as broad as long26. *S. coahuilensis*
 - β. Heads fewer and larger, 10 to 14 mm. high.
 - I. Leaves pinnately divided nearly to the midrib.
 - 1. Leaf-divisions few, cuneate to reniform27. *S. leonensis*
 - 2. Leaf-divisions many, cuneate to linear28. *S. montereyana*
 - II. Leaves pinnately divided slightly more than half-way from margin to midrib29. *S. zimapanicus*

17. *S. sanguisorboides* Rydb. Bull. Torr. Bot. Club **27**: 170. 1900; Wooton & Standley, Contr. U. S. Nat. Herb. **19**: 745. 1915.

Annual or biennial, glabrous or slightly white tomentulose in the axils of the leaves; stem 1.5 to 5 dm. high, striate; leaves usually pinnately divided into cuneate to reniform dentate or crenate-dentate divisions, the terminal division ovate-reniform, 1 to 5 cm. broad; basal and lower stem-leaves petiolate and occasionally undivided; upper stem-leaves sessile and amplexicaul; inflorescence a terminal few to several-headed corymbose cyme; heads radiate; involucre campanulate, barely calyculate; bracts of the involucre usually 13 (rarely 16), lanceolate, 6 to 6.5 mm. long, glabrous; ray-flowers 8 to 10; disk-flowers 30 to 50; achenes ribbed, glabrous.

Distribution: mountains of New Mexico.

Specimens examined:

New Mexico: Willow Gulch, Colfax Co., alt. 3050 m., Aug., 1896, *St. John 115* (Gray Herb.); Santa Fe Cañon, 7 July, 1897, alt. 2440 m., *A. A. & E. G. Heller 3820* (Mo. Bot. Gard. Herb.), co-TYPE; Santa Fe Creek, 22 June, 1847, *Fendler 438* (Mo. Bot. Gard. Herb.); White Mountains, Lincoln Co., alt. 3048 m., 16 Aug., 1897, *Wootton 494* (Mo. Bot. Gard. Herb.); mouth of Pouchuelo Creek, Pecos River National Forest, alt. 2590 m., 30 June, 1908, *Standley 4093* (Mo. Bot. Gard. Herb.); mouth of Mora River, Pecos River National Forest, alt. 2470 m., 7 July, 1908, *Standley 4250* (Mo. Bot. Gard. Herb.); Pecos River Indian Reservation, 17 July, 1898, *Coghill 71* (Mo. Bot. Gard. Herb.).

18. *S. glabellus* Poir, Dict. 7 : 102. 1806; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32 : 19. 1902; Gray, Manual, 853, ed. 7, 1907; Britton & Brown, Ill. Fl. 3 : 540, ed. 2, 1913.

S. lyratus Michx. Fl. Bor. Am. 2 : 120. 1803, not L.

S. lobatus Pers. Syn. 2 : 436. 1807; Nutt. Gen. 2 : 165. 1818; Elliot, Sk. 2 : 332. 1824; Torr. & Gray, Fl. N. Am. 2 : 437. 1843; Gray, Syn. Fl. N. Am. 1² : 394. 1884, and ed. 2, 1886, mainly; Chapman, Fl. Southern U. S. 266, ed. 3, 1897; Britton & Brown, Ill. Fl. 3 : 481, ed. 1, 1898; Small, Fl. Southeastern U. S. 1303. 1903, and ed. 2, 1913; Mohr, Contr. U. S. Nat. Herb. 6 : 815. 1901.

S. carolinianus Spreng. Syst. 3 : 559. 1826.

S. densiflorus Martens, Bull. Acad. Roy. Soc. Brux. 8 : 66. 1841.

S. Schweinitzianus Nutt. Trans. Am. Phil. Soc. 7 : 413. 1841.

Annual or biennial, glabrous or slightly tomentulose in the axils of the leaves; stems erect 1 to 10 dm. high, striate; radical leaves petiolate, lyrate, occasionally undivided; those of the stem petiolate or sessile and semiamplexicaul, pinnately divided into rather remote, narrowly cuneate to subreniform unequal divisions; inflorescence a terminal corymbose cyme; heads 6 to 8 mm. high, radiate; ray-flowers 8 to 12; disk-flowers about 50; achenes usually hirtellous-puberulent.

Distribution: North Carolina west to Illinois, Missouri, and South Dakota, south to Florida and eastern Texas. Common on river bottoms and flood-plains.

Specimens examined:

North Carolina: near Wilmington, April, 1888, *McCarthy* (U. S. Nat. Herb.); without locality, *Curtis* (Gray Herb.).

South Carolina: Goose Creek, 19 May, 1885, *A. C. & F. W. Maier* (Gray Herb.); swamps, Summerville, April, 1890, *Taylor* (Field Mus. Herb.).

Georgia: Macon, coll. of 1875, *Curtiss* (U. S. Nat. Herb.); central Georgia, coll. of 1846, *Porter* (Gray Herb.); Butler Island, McIntosh Co., 27 May, 1909, *Smith 2185* (Field Mus. Herb.).

Florida: without locality, *Chapman* (Gray Herb., U. S. Nat. Herb., and Kew Herb.); Fort Orange, 10 April, 1895, *Straub 103* (Gray Herb.); near Chattahoochee, *Curtis 1565* (Gray Herb., U. S. Nat. Herb., Kew Herb., and Field Mus. Herb.); River Junction, 19 April, 1898, *Curtis 6370* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Sand Point, 8 April, 1874, *Palmer 301* (Gray Herb., U. S. Nat. Herb., and Mo. Bot. Gard. Herb.); near St. Marks, coll. of 1843, *Rugel* (Mo. Bot. Gard. Herb., and Kew Herb.); Losman's Key, May, 1891, *Simpson 154* (U. S. Nat. Herb. and Field Mus. Herb.); New

Smyrna, *Burgess 563* (Field Mus. Herb.); Gulf Hammock, April, 1876, *Garber* (Field Mus. Herb.).

Illinois: in a damp meadow near Peoria, coll. of 1903, *McDonald* (Field Mus. Herb.); river bottom opposite Decatur, April, 1864, *Stewart* (Field Mus. Herb.); Eldred, Green Co., 9 May, 1891, *Andrews* (Mo. Bot. Gard. Herb.); opposite St. Louis, July, 1839, and May, 1845, *Engelmann* (Mo. Bot. Gard. Herb. and Kew Herb.); Mississippi Valley, St. Clair Co., colls. of 1874, 1875, and 1879, *Eggert* (Mo. Bot. Gard. Herb.); near Falling Spring, 1 June, 1890, *Glatfelter* (Mo. Bot. Gard. Herb.); East St. Louis, 11 June, 1890, *Hitchcock* (Mo. Bot. Gard. Herb.).

Kentucky: Muhlenberg, 5 June, 1901, *Price* (Mo. Bot. Gard. Herb.); without locality, *Short* (Kew Herb.).

Tennessee: in swamps, Rutherford Co., July, 1892, *Bain* (U. S. Nat. Herb.).

Alabama: Tuscaloosa, April, 1892, *Ward* (U. S. Nat. Herb.); Greensboro, coll. of 1857, *Watson* (Gray Herb.); Auburn, Lee Co., 9 April, 1898, *Earle & Baker* (Field Mus. Herb.).

Mississippi: damp fields, North Carrollton, 21 April, 1899, *Clute 24* (Field Mus. Herb.); without locality, coll. of 1843, *Holton* (Kew Herb.).

South Dakota: Fort Pierre, July, 1853, *Hayden* (Mo. Bot. Gard. Herb.).

Missouri: Courtney, 15 May, 1896, *Bush 701* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); vicinity of St. Louis, coll. of about 1840, *Duerinck* (Mo. Bot. Gard. Herb.); Creve Coeur Lake, 8 May, 1859, *Glatfelter* (Mo. Bot. Gard. Herb.); near St. Louis, *Hus 4007* (Mo. Bot. Gard. Herb.); St. Louis Co., 24 May, 1896, *Shannon 250* (Mo. Bot. Gard. Herb.); St. Louis Co., 20 May, 1879, *Eggert* (Mo. Bot. Gard. Herb.); Jefferson Barracks, 6 May, 1890, *Hitchcock* (Mo. Bot. Gard. Herb.); Jefferson Co., 5 May, 1896, *Eggert* (Mo. Bot. Gard. Herb.); Kimmswick, 20 May, 1860, *Engelmann* (Mo. Bot. Gard. Herb.); Kimmswick, 23 May, 1885, *Wislizenus* (Mo. Bot. Gard. Herb.); Sulphur Springs, 14 Aug., 1910, *Sherff 1062* (Field Mus. Herb.); Osage, 13 May, 1901, *Norton* (Mo. Bot. Gard. Herb.);

Batesville, Butler Co., 21 May, 1908, *Smith 534* (Field Mus. Herb.); St. Louis, coll. of 1832, *Drummond* (Kew Herb.); St. Louis, *Riehl 382* (Kew Herb.).

Arkansas: Fulton, 17 April, 1905, *Bush 2354* (Mo. Bot. Gard. Herb.); Fulton, 24 April, 1914, *Palmer 5381* (Mo. Bot. Gard. Herb.); Arkansas Post, 20 March, 1909, *Kellogg* (Mo. Bot. Gard. Herb.); Little Rock, 22 April, 1909, *McNair* (U. S. Nat. Herb.); Little Rock, June, 1886, *Hasse* (Field Mus. Herb.).

Louisiana: without locality, *Hale* (Gray Herb. and Kew Herb.); Gretna, 28 April, 1899, *Ball 315* (Gray Herb., U. S. Nat. Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); between New Orleans and Balize, May, 1829, *Berlandier 556, 1946* (Gray Herb. and Mo. Bot. Gard. Herb.); Balize, April, 1839, *Lindheimer* (Mo. Bot. Gard. Herb.); Baton Rouge, 22 Jan., 1874, *Joor* (Mo. Bot. Gard. Herb.); Holly Ridge, West Carroll Parish, July, 1910, *Mosely* (Field Mus. Herb.); swampy woods, Natchitoches, 16 April, 1915, *Palmer 7253* (Mo. Bot. Gard. Herb.); New Orleans, *Drummond 176, 626* (Kew Herb.); New Orleans, coll. of 26 March, 1847, *Bromfield* (Kew Herb.).

Texas: low ground, San Augustine, 31 March, 1915, *Palmer 7114* (Mo. Bot. Gard. Herb.).

Forma **robustior**, forma nova.

Stout herb; upper stem-leaves 1.5 to 2 dm. long, 8 to 10 cm. wide; the large lateral obovate leaf-lobes alternating with smaller wedge-shaped divisions of the leaf.

Georgia: ditch banks, near Savannah, 21 March, 1882, *J. D. Smith* (Gray Herb.), TYPE. This plant appears to be a giant form with rather marked foliage.

19. **S. Greggii** Rydb. Bull. Torr. Bot. Club 27: 170. 1900.

S. tampicanus Gray, Pl. Fendl. 109. 1849 (in Mem. Am. Acad. N. S. 4), not DC.

S. lobatus Gray, Pl. Wright., part 2, 99. 1853 (in Smithson. Contr. 5), not Pers.

Annual or biennial, glabrous or with a slight tomentum in the leaf-axils and on the upper side of the leaf along the mid-

rib; stems one to several from a common base, 1.5 to 4 dm. high, striate; leaves lyrate to pinnately divided into cuneate to subrotund divisions; inflorescence a terminal corymbose cyme; heads 5 to 8 mm. high, radiate; involucre campanulate, slightly calyculate; bracts of the involucre about 21, linear-lanceolate, 3 to 5 mm. long, glabrous; ray-flowers 8 to 12; disk-flowers 45 to 60; achenes hispidulous.

Distribution: southern New Mexico, western Texas, and northern Mexico.

Specimens examined:

New Mexico: banks of the Rio Grande near El Paso, *Wright 1413* (Gray Herb.).

Texas: valley of the Rio Grande, below Doñana, Mexican Boundary Survey, *Parry 659* (U. S. Nat. Herb.); El Paso, May, 1881, *Vasey* (U. S. Nat. Herb.); southeastern Texas, Sept., 1879 to Oct., 1880, *Palmer 754* (Gray Herb.).

Chihuahua: valley of Rio Parral, near Santa Rosalia, 21 April, 1847, *Gregg 11*, (Gray Herb.) co-TYPE; valley near Ortiz, 11 April, 1887, *Pringle* (Field Mus. Herb.).

20. *S. imparipinnatus* Klatt, Natur. Gesell. Halle **15** : 333. 1881; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32** : 19. 1902.

S. lobatus Gray, Syn. Fl. N. Am. **12** : 394. 1884, and ed. 2. 1886, in part, not Pers.; Coulter, Contr. U. S. Nat. Herb. **2** : 241. 1892, in part, not Pers.

Annual or biennial, glabrous or slightly floccose-tomentulose in the axils of the leaves; stems slender, 1.5 to 4 dm. high, simple or branched from the base; leaves 2 to 10 cm. long, 1 to 3 cm. broad, lyrate to pinnately divided or the lowermost occasionally undivided; the upper stem-leaves remote, sessile, and pinnately divided into small linear and entire to abruptly cuneate and unequally toothed lateral divisions; inflorescence a terminal few-headed corymbose cyme; heads 6 to 8 mm. high, radiate; involucre campanulate, glabrous, minutely calyculate; bracts of the involucre usually 21, linear-lanceolate, 3 to 5 mm. long, acute; ray-flowers 8 to 12; disk-flowers commonly 50 to 60; achenes hirtellous-puberulent.

Distribution: western Louisiana, Oklahoma, and Texas.

Specimens examined:

Louisiana: without locality, *Leavenworth* (Gray Herb. and Kew Herb.).

Oklahoma: Rock Creek, coll. of 1884, *Tufts* (U. S. Nat. Herb.); between Fort Cobb and Fort Arbuckle, coll. of 1868, *Palmer 462* (U. S. Nat. Herb.); near Indianola, *Pope* (Gray Herb.); Muskogee, May, 1894, *Schenck* (Field Mus. Herb.); near Paul's Valley, Garvin County, 19 April, 1913, *Stevens 108* (Mo. Bot. Gard. Herb.).

Texas: Dallas, 16 April, 1901, *Reverchon 558* (Mo. Bot. Gard. Herb.); in waste ground, Tarrant Co., 5 May, 1912, *Ruth 367* (Mo. Bot. Gard. Herb.); Waco, *Pace 122* (Mo. Bot. Gard. Herb.); Navarro Co., 22 May, 1880, *Joor* (Mo. Bot. Gard. Herb.); wet ground, Houston, May, 1872, *Hall 368* (U. S. Nat. Herb. and Field Mus. Herb.); Harrisburg, 24 April, 1899, *Eggert* (Mo. Bot. Gard. Herb.); Harris Co., 13 and 22 May, 1876, *Joor* (Mo. Bot. Gard. Herb.); vicinity of Huntsville, 6-12 May, 1910, *Dixon 516* (Field Mus. Herb.); Columbia, 6 April, 1899, *Bush 56* (Mo. Bot. Gard. Herb.); Columbia, 31 March, 1902, *Bush 1263* (Mo. Bot. Gard. Herb.); along Corpus Christi Bay, 21 March, 1894, *Heller 1476* (Gray Herb., U. S. Nat. Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); Corpus Christi, 7 April, 1905, *Tracy 8927* (Field Mus. Herb. and Mo. Bot. Gard. Herb.); low prairies near Rosenberg, 5 April, 1900, *Eggert* (Mo. Bot. Gard. Herb.); Richmond, 15 March, 1914, *Palmer 4954* (Mo. Bot. Gard. Herb.); Hungerford, 4 March, 1914, *Palmer 4844* (Mo. Bot. Gard. Herb.); Austin, March, 1870, *Bodin 52* (U. S. Nat. Herb.); "Bejar a la villa de Austin," *Berlandier 1741, 421* (Gray Herb.), CO-TYPE; near Belknap, 20 April, 1858, *Sutton Hays 515* (Field Mus. Herb.); Brazos, coll. of 1889, *Nealley 91, 280* (Field Mus. Herb. and Mo. Bot. Gard. Herb.); Brazos, April, 1859, *Lindheimer* (Mo. Bot. Gard. Herb.); bottom land between Laredo and Palafox, *Schott* (Field Mus. Herb.).

21. **S. Millefolium** Torr. & Gray, Fl. N. Am. 2: 444. 1843; Gray, Syn. Fl. N. Am. 1²: 392. 1884, and ed. 2, 1886; Chap-

man, Fl. Southern U. S., ed. 3, 266. 1897; Small, Fl. South-eastern U. S. 1305. 1903, and ed. 2, 1913.

An herbaceous perennial, glabrous or with a white floccose-tomentum at the base of the stem and in the axils of the leaves; stems 3 to 7 dm. high, striate; leaves bi-tri-pinnately dissected into linear segments; basal and lower stem-leaves petiolate, 1 to 2.5 dm. long, 1.5 to 6 cm. wide, the upper ones sessile; inflorescence terminating the stem in a corymbose cyme; heads 8 to 10 mm. high, radiate; involucre campanulate, sparingly calyculate, glabrous; bracts of the involucre 4 to 6 mm. long; ray-flowers 8 to 12; disk-flowers numerous, usually 50 to 60; achenes hirtellous-puberulent.

Distribution: mountains of North Carolina and South Carolina.

Specimens examined:

North Carolina: slope of Caesar's Head, 3 Sept., 1876, *Engelmann* (Mo. Bot. Gard. Herb.); without locality, coll. of 1888, *Boynton* (U. S. Nat. Herb.); dry, rocky places on White Oak Mountains, Polk Co., alt. 850 m., 4 May, 1897, *Biltmore Herb. 1301^b* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.); Skyuka Mountains, Polk Co., 25 May, 1899, *Churchill* (Gray Herb.).

South Carolina: Table Rock, coll. of 1842, *Buckley* (Gray Herb. and Mo. Bot. Gard. Herb.); "Carolina," *Fraser* (Gray Herb.), part of TYPE; Caesar's Head, Aug., 1876, *Canby* (U. S. Nat. Herb.).

22. *S. tampicanus* DC. Prodr. 6: 427. 1837; Hemsl. Biol. Cent.-Am. Bot. 2: 248. 1881, excl. plant of Wright.

S. Ervendbergii Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32: 19. 1902; Field Col. Mus. Bot. Ser. 2: 275. 1907.

Glabrous throughout; stem 4 dm. or more high, terete, striate, leafy; leaves thin, pinnately divided into cuneate to obovate, unequally dentate divisions; lower leaves petiolate, 1 to 3 dm. long, the upper ones sessile and amplexicaul by a large stipular-like base; inflorescence a terminal compound corymbose many-headed cyme; heads small, 5 to 7 mm. high,

radiate; involucre campanulate, glabrous, minutely calyculate; bracts of the involucre 21, linear-lanceolate, 3 to 4 mm. long; ray-flowers about 13; disk-flowers numerous, 70 to 90; achenes hirtellous along the ribs.

Distribution: eastern Mexico.

Specimens examined:

Tamaulipas: Tampico, coll. of 1827, *Berlandier 186* (Berlin Herb., tracing and fragments in Gray Herb.), CO-TYPE.

Vera Cruz: Wartemberg, near Tantoyuca, coll. of 1858, *Ervendberg 90* (Gray Herb.); without locality, *Liebmänn 172* (Copenhagen Herb., tracing and fragments in Gray Herb.).

Puebla: near Metaltoyuca, alt. 240 m., 27 Feb., 1898, *Goldman 74* (U. S. Nat. Herb. and Gray Herb.).

San Luis Potosi: without definite locality, *Parry & Palmer 533* (Gray Herb.).

23. *S. hypotrichus* Greenm.¹

S. Sanguisorbae Hemsl. Biol. Cent.-Am. Bot. 2 : 246. 1881, in part, not DC.

An herbaceous perennial; stem 7 dm. high, erect, striate, glabrous, somewhat purplish, branched above; leaves pinnately divided into cuneate to rhombic-ovate dentate unequal divisions, glabrous above, crisp-hirsute beneath; lower leaves including the petiole 2 to 3 dm. long, 4 to 9 cm. broad, the upper stem-leaves sessile, semiamplexicaul and gradually reduced towards the terminal corymbose cyme; heads 8 to 10 mm. high, radiate; involucre campanulate, sparingly calyculate; bracts of the involucre usually 21, linear-lanceolate,

¹*Senecio hypotrichus* Greenm. sp. nov. herbaceus perennis; caule erecto circiter 7 dm. alto tereti striato stramineo vel plus minusve purpurascenti glabro, superne ramoso; foliis pinnatifidis, inferioribus petiolatis usque ad 3 dm. longis, 4 to 9 cm. latis, superioribus sessilibus et semiamplexicaulibus gradatim reductis, laciniis anguste cuneatis vel obovatis vel rhombo-ovatis subcrenato-dentatis supra glabris subtus crispo-hirsutis; inflorescentiis terminalibus corymboso-cymosis; capitulis 8-10 mm. altis radiatis; involucri squamis plerumque 21 lineari-lanceolatis 5-6 mm. longis glabris; flosculis liguliferis saepius 13, ligulis oblongis, 6-7 mm. longis, 2.5 mm. latis, 4-5-nerviis; floribus disci 60-70; achaeniis glabris. —Region of San Luis Potosi, Mexico, alt. 1830-2440 m., coll. of 1878, *Parry & Palmer 533* (U. S. Nat. Herb.), TYPE. The Gray Herbarium specimen of Parry and Palmer's No. 533 differs from the United States National Herbarium specimen above cited in having glabrous leaves, smaller and more numerous flowered heads and hirtellous achenes; it has been referred to *S. tampicanus* DC.

5 to 6 mm. long, glabrous; ray-flowers 13, rays oblong, 6 to 7 mm. long, 2.5 mm. broad, 4-5-nerved; disk-flowers 60 to 70; achenes glabrous.

Distribution: central Mexico.

San Luis Potosi: "region of San Luis Potosi," alt. 1830-2440 m., coll. of 1878, *Parry & Palmer 533* (U. S. Nat. Herb.), TYPE.

24. *S. Sanguisorbae* DC. Prodr. 6: 427. 1837; Hemsl. Biol. Cent.-Am. Bot. 2: 246, 1881, in part; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32: 19. 1902.

An herbaceous perennial; stem erect, 3 to 10 dm. high, striate, glabrous, simple or branched; leaves pinnately divided, the radical and lower stem-leaves petiolate including the petiole 1 to 4 dm. long, 3 to 13 cm. broad, glabrous on both surfaces or slightly subarachnoid beneath, the upper stem-leaves sessile and more or less amplexicaul; lateral leaf-segments oblong-cuneate to oblong-ovate, 1 to 7 cm. long, .3 to 5.5 cm. broad, rather coarsely dentate, the terminal segment usually broadly obovate; inflorescence a terminal many-headed corymbose cyme; heads 6 to 8 mm. high, radiate; involucre narrowly campanulate, sparingly calyculate; bracts of the involucre 8 to 13, linear-lanceolate 4.5 to 6 mm. long, glabrous; ray-flowers 5 to 8; disk-flowers 15 to 25; achenes glabrous.

Distribution: southern Mexico.

Specimens examined:

Hidalgo: by brooks, Sierra de Pachuca, alt. 3050 m., Aug., 1902, *Pringle 9959* (Gray Herb. and Mo. Bot. Gard. Herb.); Sierra de Pachuca, 1 Sept., 1903, *Rose & Painter 6739* (Gray Herb.).

Mexico: Toluca, coll. of 1854, *Schaffner* (Gray Herb. and Berlin Herb.); Valley of Mexico, Sante Fe, *Bourgeau 832* (Gray Herb., U. S. Nat. Herb., Berlin Herb., and Kew Herb.); without locality, *Gregg 691* (Mo. Bot. Gard. Herb.); Cima, 24 Aug., 1910, *Orcutt 3767* (Mo. Bot. Gard. Herb.); in moist soil along brooks, Mt. Ixtaccihuatl, alt. 3050-3350 m., Nov., 1905, *Purpus 1514* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); in moist soil, Mt. Popocatepetl, Sept., 1908, *Purpus*

3044 (Field Mus. Herb. and Mo. Bot. Gard. Herb.); Mt. Popocatepetl, 7 and 8 Aug., 1901, *Rose & Hay* 6069 (U. S. Nat. Herb.); without locality, *Uhde* 582, 602, 603, 609, 624 (Berlin Herb.); without locality, coll. of 1848-49, *Gregg* 673 (Gray Herb.).

Michoacan: Angangueo, *Hartweg* 313 (Berlin Herb.); cool summits of mountains near Patzcuaro, 2 Aug., 1892, *Pringle* 4129 (Gray Herb., U. S. Nat. Herb. and Mo. Bot. Gard. Herb.).

25. *S. pinnatisectus* DC. Prodr. 6 : 427. 1837; Hemsl. Biol. Cent.-Am. Bot. 2 : 245. 1881; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32 : 19. 1902.

Cineraria pinnata La Llav. & Lex. Nov. Veg. Deser. fasc. 1, 26. 1824.

An herbaceous perennial; stem erect, 4 dm. or more high, striate, glabrous or slightly tomentulose; leaves pinnately divided, the lower petiolate, including the petiole 1 to 3 dm. long, 3 to 8 cm. broad, the upper sessile and amplexicaul, at first white floccose-tomentulose, later glabrate except for the persistent tomentum along both sides of the rhachis; lateral divisions of the leaf narrowly oblong, sharply serrate-dentate, terminal division obovate-cuneate; inflorescence a terminal compound compact corymbose cyme; heads numerous, 6 to 7 mm. high, radiate; involucre calyculate, glabrous; bracts of the involucre usually 13; ray-flowers commonly 6 to 8; disk-flowers 15 to 20; achenes glabrous.

Distribution: southern Mexico.

Specimens examined:

Hidalgo: Real del Monte, *Ehrenberg* 386 (Berlin Herb. and Gray Herb.), also 386^a, 386^b (Berlin Herb.); Real del Monte, coll. of 1830, *Graham* (Gray Herb. and Kew Herb.).

Michoacan (?): Angangueo, *Chrismar* (Berlin Herb.); "Cuesta de las papao Angangueo," *Schiede* (Berlin Herb.).

Mexico, without definite locality: *Bates*, *Mackenzie*, and also *Parkinson* (Kew Herb.).

This species is closely related to the preceding, but differs in the narrower lateral leaf-segments, slightly smaller heads,

and persistent floccose tomentum along the rhachis or midrib.

26. *S. coahuilensis* Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32** : 19. 1902; Field Col. Mus. Bot. Ser. **2** : 275. 1907. Plate 19, fig. 2.

An herbaceous perennial, glabrous or essentially so throughout; stem erect, 3 to 8 dm. high, branched, striate; leaves pinnately divided into obovate to subreniform cuneate-dentate divisions, thickish and firm in texture, glabrous on both surfaces or slightly pubescent on the veins beneath; lower leaves including the petiole 1 to 3 dm. long, 2 to 5 cm. broad, the upper stem-leaves sessile and amplexicaul; inflorescence terminating the stem and branches in a compound corymbose cyme; heads 7 to 10 mm. high, radiate; involucre campanulate, calyculate with a few small bracteoles, glabrous; bracts of the involucre 13 to 18, linear-lanceolate, 4 to 6 mm. long, thickish; ray-flowers 8 to 10, rays oblong, 3 to 5 mm. long, 4-nerved; disk-flowers 35 to 45; achenes ribbed, glabrous.

Distribution: northern Mexico.

Coahuila: Lerios, Feb. to Oct., 1880, *Palmer 755* (Gray Herb., Kew Herb., and U. S. Nat. Herb.), TYPE; without locality, coll. of 1848-49, *Gregg 403* (Gray Herb. and Mo. Bot. Gard. Herb.).

27. *S. leonensis* Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32** : 19. 1902; Field Col. Mus. Bot. Ser. **2** : 276. 1907. Plate 19, fig. 1.

An herbaceous perennial, more or less lanate-tomentose throughout, somewhat glabrate in age; stem 2 to 3 dm. high, leafy at the base, essentially naked above; leaves petiolate, pinnately divided, including the petiole 8 to 12 cm. long, about 3 cm. broad, at first lanate-tomentulose on both surfaces, later glabrate; divisions of the leaf rather coarsely, somewhat unequally and sharply dentate, the terminal segment subreniform, the lateral ones (3 to 6 on either side) obovate-cuneate; heads few, about 1 cm. high, radiate; involucre campanulate, slightly calyculate and, as well as the bracteate peduncle, tomentulose; bracts of the involucre about 13; disk-flowers numerous, 50 to 60; achenes pubescent.

Distribution: northern Mexico.

Specimen examined:

Nuevo Leon: Sierra Madre, near Monterey, 1 June, 1889, *Pringle 2894* (Gray Herb.), TYPE.

28. *S. montereyana* Wats. Proc. Am. Acad. **25**: 155. 1890; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32**: 19. 1902.

An herbaceous perennial, more or less white-tomentose throughout; stems one to several, 2.5 to 4 dm. high, from a rather stout ascending rootstock; leaves mostly radical, including the petiole 1 to 2 dm. long, 1.5 to 3 cm. broad, pinnately divided into narrow, oblong, cuneate to sublinear, entire or few-toothed divisions, at first white-floccose-tomentose on both surfaces, somewhat glabrate above; heads few, 10 to 12 mm. high, radiate, on long naked peduncles; involucre campanulate, calyculate with minute bracteoles, tomentose; bracts of the involucre slightly shorter than the numerous flowers of the disk; ray-flowers about 12; achenes hirtellous-pubescent.

Distribution: northern Mexico.

Specimens examined:

Nuevo Leon: dry shaded ledges of the Sierra Madre, near Monterey, 27 June, 1888, *Pringle 1922* (Gray Herb., U. S. Nat. Herb., Kew Herb., and Mo. Bot. Gard. Herb.), TYPE.

29. *S. zimapanicus* Hemsl. Biol. Cent.-Am. Bot. **2**: 248. 1881; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32**: 19. 1902.

An herbaceous perennial; stems 3 to 4.5 dm. high, simple, leafy below, nearly naked above, striate, more or less pubescent with flaccid-hirsute, jointed, and somewhat matted hairs; leaves mostly basal, sessile or essentially so, 3 to 18 cm. long, 1 to 3 cm. broad, pinnately lobed or divided into oblong-ovate dentate divisions, flaccid-hirsute or subarachnoid-pubescent on both surfaces, more densely so beneath; inflorescence a terminal corymbose few-headed cyme; heads large, 10 to 14 mm. high, conspicuously calyculate, radiate; bracts of the involucre commonly 21 (15-21) linear-lanceolate, 7 to 9 mm. long, thickish, glabrous except at the penicillate tip; ray-

flowers 12 to 15, rays oblong, 10 to 12 mm. long; disk-flowers numerous; achenes about 3 mm. long, ribbed, slightly pubescent on the ribs.

Distribution: eastern Mexico.

Specimens examined:

Hildago: Zimapan, *Coulter 423* (Kew Herb.), TYPE.

Tamaulipas: near Miquihuana, alt. 2140 to 2740 m., 10 June, 1898, *Nelson 4492* (Gray Herb. and U. S. Nat. Herb.).

SECT. 5. BOLANDERIANI Greenm.

§ 5. BOLANDERIANI Greenm. Monogr. Senecio, I. Teil, 22, 23. 1901, and in Engl. Bot. Jahrb. 32 : 18, 19. 1902.

Slender, herbaceous perennials; stems erect or nearly so, 1 to 5 dm. high, from a slender more or less horizontal rootstock; leaves undivided and orbicular-ovate to pinnatifid; heads of medium size, about 1 cm. high, radiate; achenes glabrous. Sp. 30–32.

A. Stems 1.5 to 5 dm. high, leafy to the inflorescence.

a. Leaves usually pubescent beneath; bracts of the involucre 6 to 9 mm. long, more or less hairy. 30. *S. Bolanderi*

b. Leaves glabrous on both surfaces; bracts of the involucre 5 to 6.5 mm. long, glabrous 31. *S. Harfordii*

B. Stems 1 to 2 dm. high, leafy only at the base. 32. *S. Flettii*

30. *S. Bolanderi* Gray, Proc. Am. Acad. 7 : 362. 1868; Bot. Calif. 1 : 411. 1876, in part; Syn. Fl. N. Am. 1² : 392. 1884, and ed. 2, 1886, in part; Howell, Fl. N. W. Am. 1 : 379. 1900, in part; Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. 32 : 19. 1902.

A slender herbaceous perennial; stems ascending or erect, from a creeping rootstock, 1.5 to 5 dm. high, striate, often somewhat purplish; radical and lower stem-leaves undivided and crenately lobed-dentate to pinnately divided into oblong, obovate to subrotund, crenate to sharply dentate divisions, glabrous above, usually pubescent beneath, including the petiole .5 to 1.5 dm. long, 1 to 3 cm. broad; the upper stem-leaves sessile; inflorescence terminating the stem in a few-headed subcorymbose cyme; heads 10 to 12 mm. high, radiate; involucre campanulate, calyculate, usually tawny pubescent; bracts of the involucre about 13, linear-lanceolate, 6 to 9 mm.

long; ray-flowers 5 to 8; disk-flowers rather numerous, 25 to 45; achenes glabrous.

Distribution: California and Oregon, near the coast.

Specimens examined:

California: on sand-stone bluffs at the mouth of the river below Mendocino City, May, 1866, *Bolander 4816* (Gray Herb., Field Mus. Herb., and Mo. Bot. Gard. Herb.), TYPE; Humboldt, coll. of 1868-69, *Kellogg & Harford 539* (U. S. Nat. Herb. and Mo. Bot. Gard. Herb.); Humboldt, coll. of 1866, *Kellogg 539* (Gray Herb.); Redwoods, Eel River, coll. of 1878, *Rattan 33* (Gray Herb.); near Crescent City, Del Monte Co., June, 1892, *Burt-Davy & Blasdale 1072* (Field Mus. Herb.).

Oregon: Coast Mountains, Lat. 42°, June, 1884, *Howell 162* (Gray Herb.); Newport, June, 1892, *Mulford* (Mo. Bot. Gard. Herb.).

31. *S. Harfordii* Greenm. Contr. U. S. Nat. Herb. **11** : 597. 1906.

S. Bolanderi var. *oregonensis* Greenm. Monogr. Senecio, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32** : 19. 1902.

A slender herbaceous perennial, glabrous throughout; stem erect or ascending from a creeping rootstock, 2 to 5 dm. high, usually leafy; leaves mostly pinnately divided into cuneate to subrotund crenate to lacinate-dentate divisions; the radical and lower stem-leaves petiolate, including the petiole 4 to 14 cm. long, 1 to 5 cm. broad, occasionally undivided, subrotund and crenately lobed and the lobes again crenate-dentate, thin in texture, pale green in the dried state; the upper stem-leaves sessile; inflorescence a few-headed corymbose cyme; heads 8 to 10 mm. high, radiate, including the conspicuous yellow rays 1.5 to 2 cm. in diameter; bracts of the involucre usually 13, narrowly lanceolate, 5 to 6 cm. long, acuminate, acute, glabrous; ray-flowers usually 5 (-8); disk-flowers 15 to 25; mature achenes 2.5 to 3.5 mm. long, glabrous.

Distribution: mountains of Washington and Oregon.

Specimens examined:

Washington: on mountains near the Lower Cascades, Skamania Co., 29 May, 1886, *Suksdorf* (Gray Herb.); in

woods, Lower Cascades, 29 May, 1887, *Suksdorf 872* (Mo. Bot. Gard. Herb.); summit of Mt. Adams, 4 Aug., 1899, *Flett 1087* (Piper Herb.).

Oregon: Rooster Rock, June, 1877, *Howell* (Gray Herb.); Cascade Mountains, 31 May, 1868–69, “*Kellogg & Harford*,” namely *Harford & Dunn 540* (Gray Herb.), TYPE; near Bonneville, Multnomah Co., 11 July, 1885, *Suksdorf 572* (Gray Herb.); Multnomah Falls, 25 June, 1904, *Piper 6212* (Gray Herb.); Bonneville, 24 June, 1905, *Palmer* (U. S. Nat. Herb.).

32. *S. Flettii* Wiegand, Bull. Torr. Bot. Club **26**: 137, *pl. 355*. 1899; Greenm. Monogr. *Senecio*, I. Teil, 23. 1901, and in Engl. Bot. Jahrb. **32**: 19. 1902; Piper, Contr. U. S. Nat. Herb. **11**: 597. 1906.

An herbaceous perennial, 1 to 2 dm. high, glabrous throughout; leaves mostly basal, petiolate, including the petiole 4 to 12 cm. long, 1.5 to 2 cm. broad, undivided, ovate-orbicular and crenate-dentate to pinnately parted, upper stem-leaves few, 1 to 3, incisely pinnate to linear and bractiform; inflorescence terminating the stem in a few-headed corymbose cyme; heads about 1 cm. high, radiate; involucre narrowly campanulate, sparingly calyculate; bracts of the involucre 8 to 13, linear-lanceolate, 5 to 6 mm. long, thickish, glabrous; ray-flowers commonly 5; disk-flowers about 20; achenes glabrous.

Distribution: Washington.

Specimens examined:

Washington: loose rocks, Olympic Mountains, alt. 1830 m., 27 Aug., 1898, *Flett 801* (Piper Herb.), co-TYPE; Olympic Mountains, Clallam Co., Aug., 1900, *Elmer 2620* (Mo. Bot. Gard. Herb.); Angeles, Clallam Co., 29 June, 1908, *Flett 3351* (U. S. Nat. Herb.); in volcanic sands, Olympic Mountains, alt. 1525 m., Sept., 1890, *Piper 929* (Gray Herb., Mo. Bot. Gard. Herb., and U. S. Nat. Herb.); crevices of volcanic rock, Olympic Mountains, alt. 2135 m., Aug., 1895, *Piper 2196* (U. S. Nat. Herb., Gray Herb., and Piper Herb.); Yakima Region, coll. of 1882, *Brandegee 176* (Mo. Bot. Gard. Herb.).

(To be continued.)

EXPLANATION OF PLATE

PLATE 17

Senecio mohavensis Gray
California

From the type specimen, Lemmon, No. 3129, in the Gray Herbarium
of Harvard University.



GREENMAN—MONOGRAPH OF SENECIO

EXPLANATION OF PLATE

PLATE 18

Senecio durangensis Greenm.

Mexico

From the type specimen, Pringle No. 10105, in the Gray Herbarium
of Harvard University.



GREENMAN—MONOGRAPH OF SENECIO

EXPLANATION OF PLATE

PLATE 19

Fig. 1. *Senecio leonensis* Greenm.

Mexico

From the type specimen, Pringle No. 2894, in the Gray Herbarium of Harvard University.

Fig. 2. *Senecio coahuilensis* Greenm.

Mexico

From the type specimen, Palmer No. 755, in the Gray Herbarium of Harvard University.



GREENMAN—MONOGRAPH OF *SENECIO*

EXPLANATION OF PLATE

PLATE 20

Fig. 1. *Senecio Burkei* Greenm.
Canada

From Macoun's No. 69359 in the Gray Herbarium of Harvard University.

Fig. 2. *Senecio saxosus* Klatt
United States

From Baker's No. 770 in the Herbarium of the Missouri Botanical Garden.



GREENMAN—MONOGRAPH OF SENECIO

COCKAYNE, BOSTON